379

Paralaphay 21SC6-7-8 Ch. 8853
21SK3-21ST3
21VT2
24SC2
24VT1

CONTENTS

SAMS PHOTOFACT* SET No. 379

*TRADEMARK

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE St.
DENVER, COLORADO

TRADE NAME	MODEL	SET AND FOLDER No.
TELEVISION RECEIVERS		
Airline	GRX-4030A, GRX-4130A	379-1
Coronado	TV2-9414A, B, TV2-9415A, B, TV2-9416A, B, TV2-9417A, B, TV2-9418A, B, TV2-9419A, B, TV2-9420A, B, TV2-9421A, B, TV2-9422A, TV2-9423A, TV2-9424A, TV2-9425A	379-2
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Airline	GTM-1108A	379-5
David Bogen	DO70	379-6
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Meteor	7047 (Ch. 528.47500)	379-9
Mopar	918, 919, 919HR	379-10
Newcomb	E-25	379-11
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RCA 21CT, 8725-27-75-76 " " Ch CTC7A-B-D,
21CA 8865-6-7
21CD 8855-6-8 " - 21CD888-8906-7-26-27-47
Ch CTC7C-D
CTC7E-F

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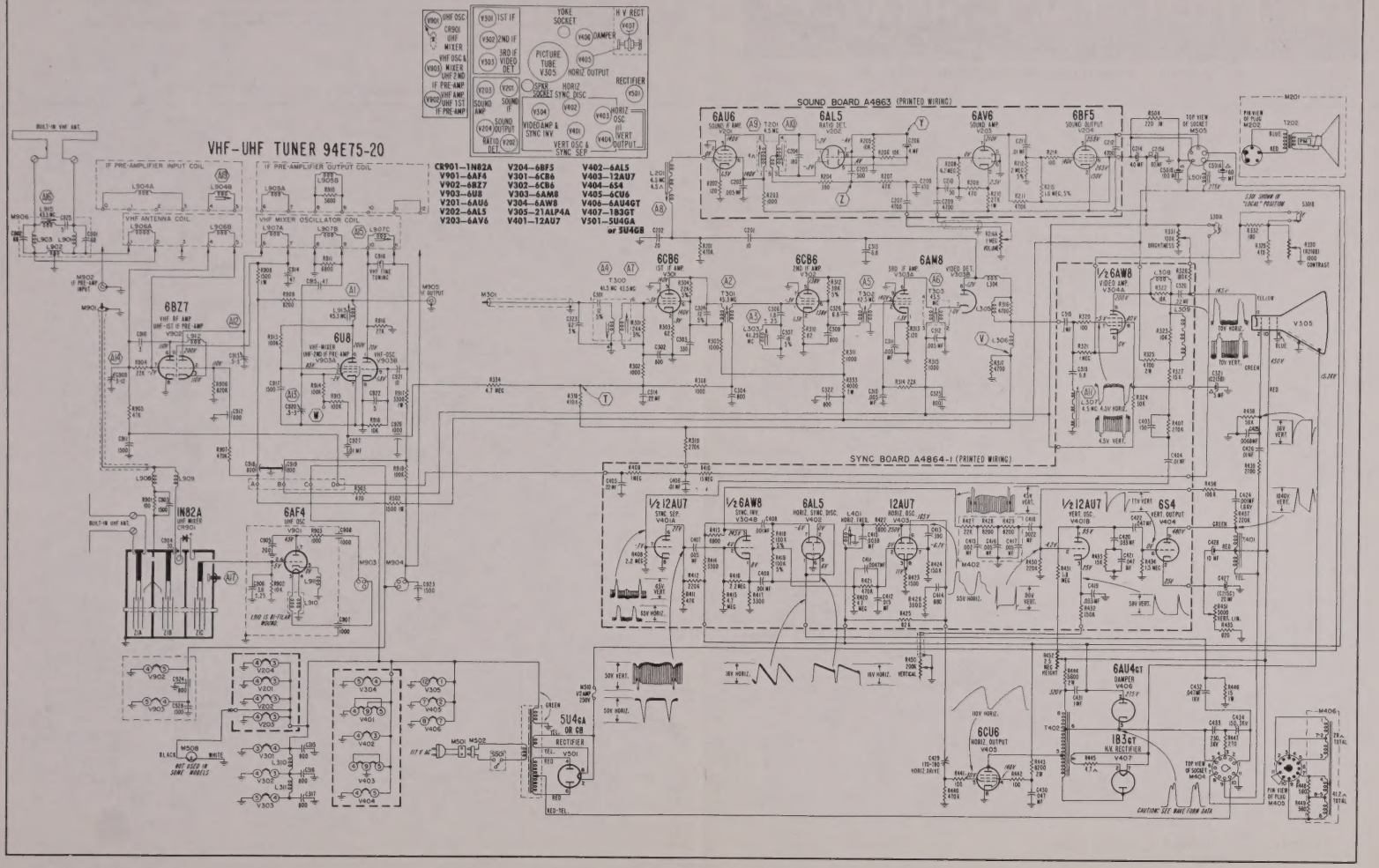

VHF-UHF TUNER 94E75-20
SOUND BOARD A4863 (PRINTED WIRING)
SYNC BOARD A4864-1 (PRINTED WIRING)
CR901—1N82A
V901—6AF4
V902—6BZ7
V903—6U8
V201—6AU6
V202—6AL5
V203—6AV6
V204—6BF5
V301—6CB6
V302—6CB6
V303—6AM8
V304—6AW8
V305—21ALP4A
V401—12AU7
V402—6AL5
V403—12AU7
V404—6S4
V405—6CU6
V406—6AU4GT
V407—1B3GT
V501—5U4GA or 5U4GB
6AU6
6AL5
6AV6
6BF5
6CB6
6CB6
6AM8
½6AW8
½12AU7
½6AW8
6AL5
12AU7
½12AU7
6S4
6AU4GT
6CU6
1B3GT
6BZ7
6U8
6AF4
1N82A
5U4GA OR GB
21ALP4A

The PHOTOFACT Servicer

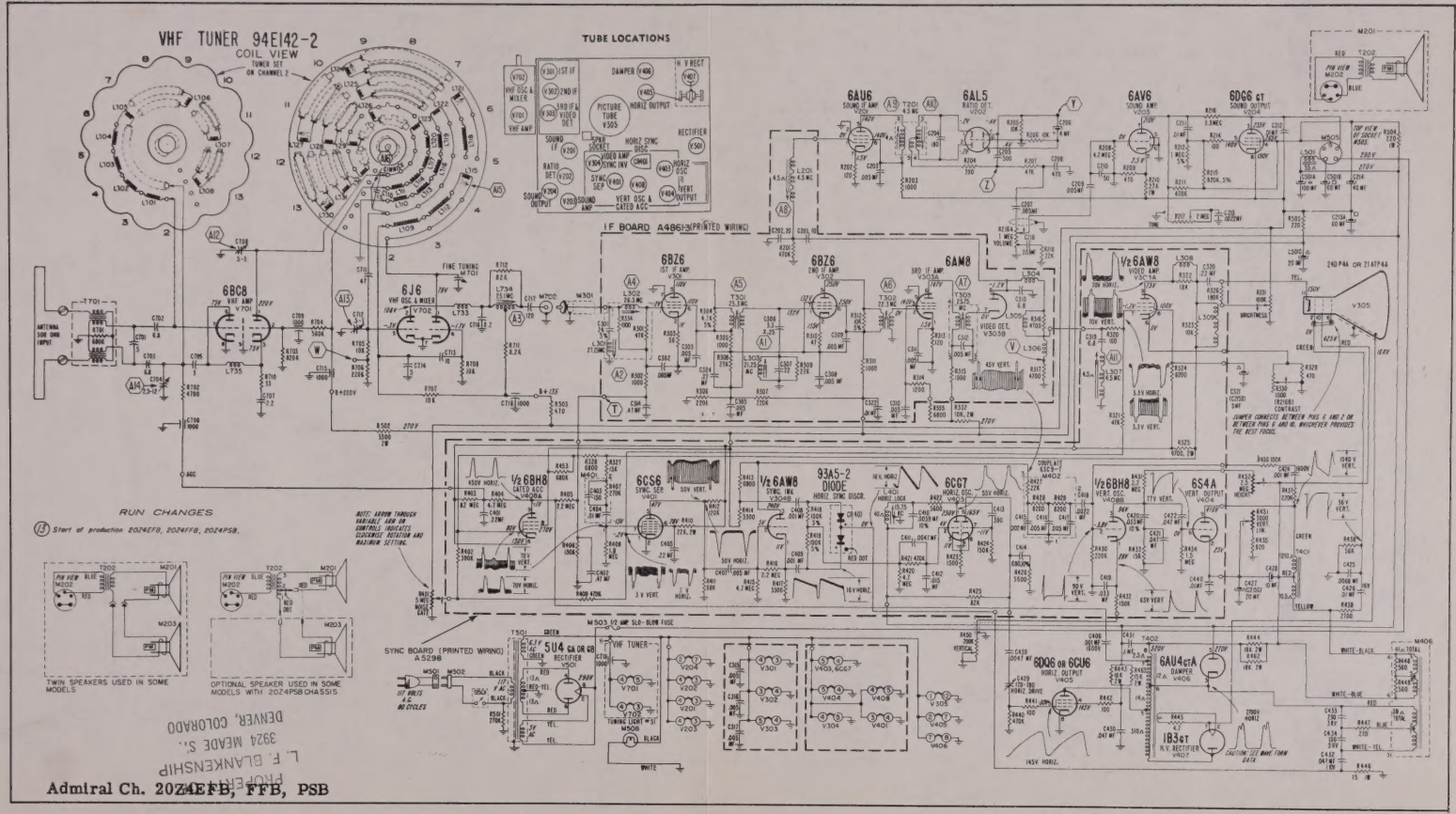
Set 379
Vol. 38

★ *Published for all users of Howard W. Sams' Photofact Folders* ★

Nov. 15, 1957

The service information in this Servicer provides data on models which we have been unable to present in PHOTOFACT Folders. The receivers are not in current production; a requirement for PHOTOFACT coverage, and we are therefore presenting schematics and supplementary data that will be of assistance when servicing these models.

Schematic Diagram Courtesy of the Admiral Corp.



Admiral Ch. 20Z4EFB, FFB, PSB

PHOTOFACT* Folder

*TRADE MARK

RETMA MEMBER

AIRLINE MODELS
GRX-4030A, GRX-4130A

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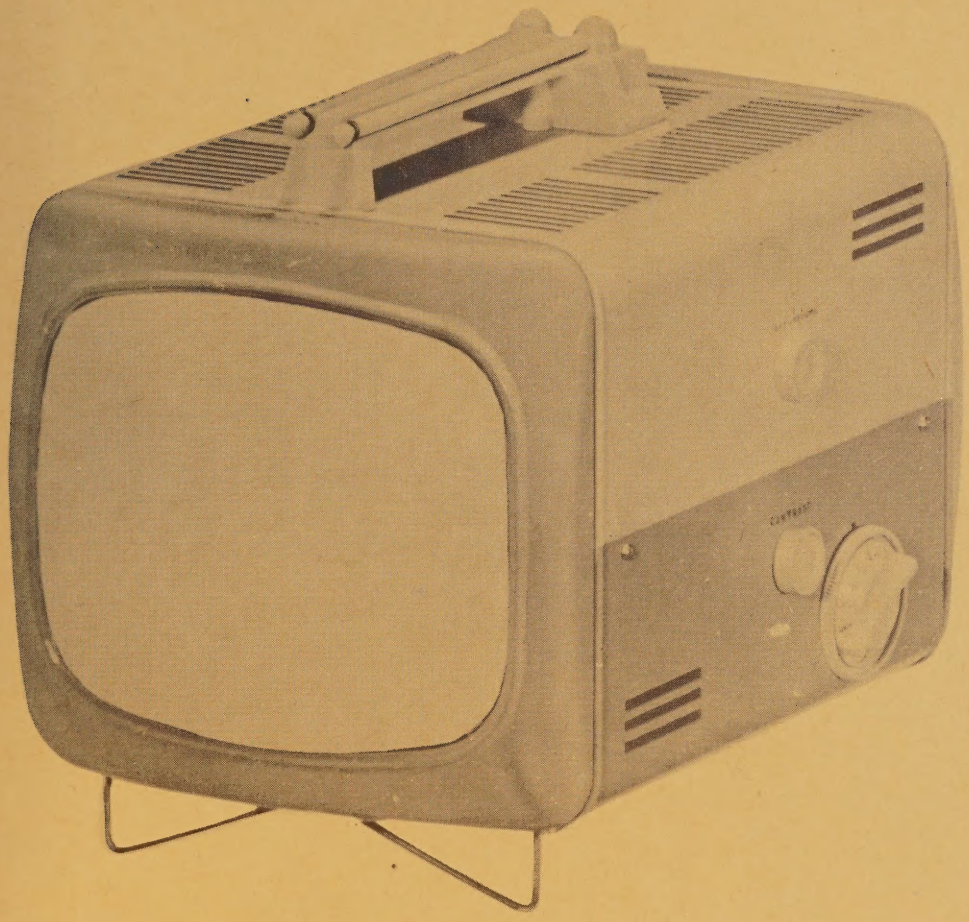

AIRLINE MODELS
GRX-4030A, GRX-4130A

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed. Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. © 1957 Howard W. Sams & Co., Inc., Indianapolis 5, Indiana. Printed in U.S. of America

FOLDER 1

PHOTOFACT* Folder
*TRADE MARK

AIRLINE MODELS GRX-4030A, GRX-4130A

PROPERTY OF
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3924 MEADE ST.
DENVER, COLORADO

DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

1. Remove 4 push-on type control knobs from the side.
2. Remove 3 metal screws and the rear cover.
3. Remove 4 metal screws securing the cabinet top.
4. Remove the built-in antenna leads and the cabinet top.
5. Remove grounding strap, picture tube socket, ion trap, yoke clamp and HV lead.
6. Remove 4 chassis bolts from the bottom.
7. Remove the chassis.

CAUTION NOTE

ONE SIDE OF AC LINE CONNECTED TO CHASSIS
Care should be exercised when connecting test equipment or physically contacting the chassis.

TRADE NAME	Airline Models GRX-4030A, GRX-4130A
SUPPLIER	Montgomery Ward & Co., 619 Chicago Ave., Chicago, Illinois
TYPE SET	Television Receiver
TUBES	Twelve
POWER SUPPLY	105-125 Volts AC, 60 Cycle RATING 110 Watts, 1 Amp. @ 117 Volts AC
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustment of the VHF oscillator is possible by removing the channel selector and fine tuning knobs. Set the fine tuning at the center of its range. One slug for HIGH band adjustment is located at 1 o'clock, and should be adjusted first. The LOW band adjustment is located at 5 o'clock. Adjust for best picture and sound.

PICTURE TUBE SAFETY GLASS CLEANING

For picture tube and safety glass cleaning, it is necessary to remove the chassis. (See disassembly instructions).

FOCUS

Adjust the ion trap for the best focus consistent with maximum brightness.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

The horizontal frequency coil is used as the horizontal hold control. Adjust the horizontal hold until the picture synchronizes horizontally. (For location, see tube placement chart).

FUSES

A 5.6Ω fusible resistor (R61) is used for LV power supply protection. (For location, see tube placement chart).

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube. Rotate the two rings around the neck of the tube until the picture is properly centered.

AIRLINE MODELS
GRX-4030A, GRX-4130A

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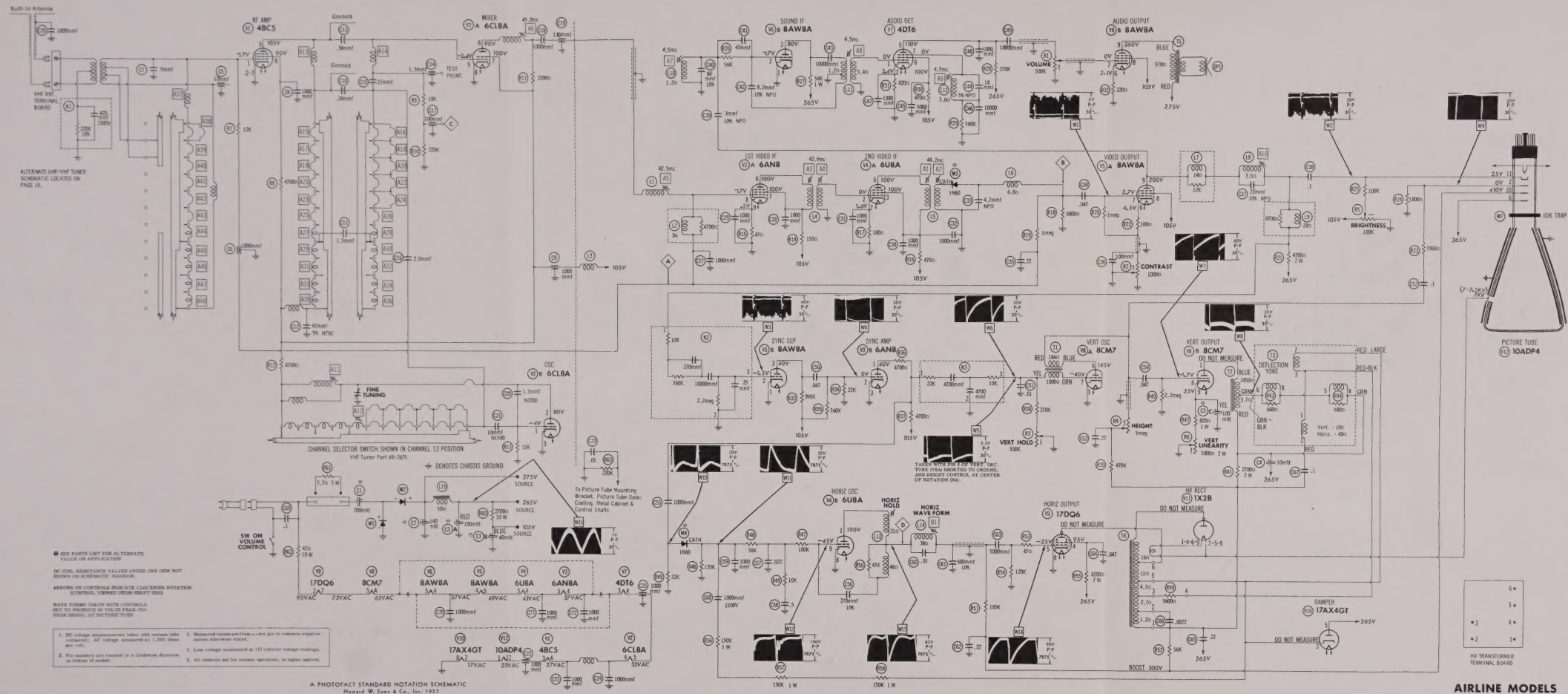
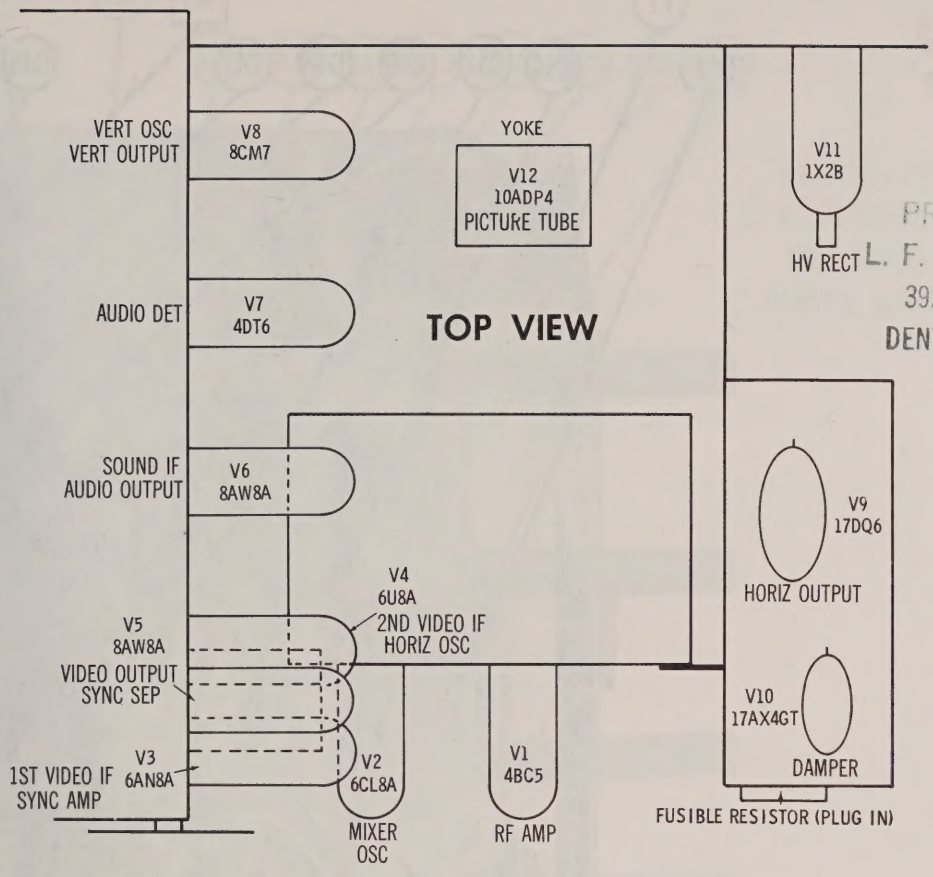
H146R

DATE 11-57 SET 379 FOLDER 1

FOLDER 1


AIRLINE MODELS
GRX-4030A, GRX-4130A
A PHOTOFACT STANDARD NOTATION SCHEMATIC
Howard W. Sams & Co., Inc. 1957
RF AMP V1 4BC5
MIXER V2 A 6CL8A
OSC V2 B 6CL8A
SOUND IF V6 B 8AW8A
AUDIO DET V7 4DT6
AUDIO OUTPUT V9 B 8AW8A
1ST VIDEO IF V3 A 6AN8
2ND VIDEO IF V4 A 6U8A
VIDEO OUTPUT V5 A 8AW8A
SYNC SEP V5 B 8AW8A
SYNC AMP V3 B 6AN8A
VERT OSC V1 A 8CM7
VERT OUTPUT V8 B 8CM7
HORIZ OSC V4 B 6U8A
HORIZ OUTPUT V5 17DQ6
HV RECT V11 1X2B
DAMPER V10 17AX4GT
PICTURE TUBE V13 10ADP4
ION TRAP
DEFLECTION YOKE
VOLUME 500K
BRIGHTNESS 100K
CONTRAST 1000
HEIGHT 5meg
VERT LINEARITY 5000Ω 2W
VERT HOLD 500K
HORIZ HOLD
HORIZ WAVE FORM
FINE TUNING
SW ON VOLUME CONTROL
CHANNEL SELECTOR SWITCH SHOWN IN CHANNEL 13 POSITION
VHF Tuner Part #R-2675
ALTERNATE UHF-VHF TUNER SCHEMATIC LOCATED ON PAGE 18.
VHF ANT. TERMINAL BOARD
TEST POINT
DENOTES CHASSIS GROUND
27.5V SOURCE
26.5V SOURCE
10.5V SOURCE
To Picture Tube Mounting Bracket, Picture Tube Outer Coating, Metal Cabinet & Control Shafts
TAKEN WITH PIX C OF VERT. DEC. TUBE (V8A) SHORTED TO GROUND, AND BRIGHT CONTROL AT CENTER OF ROTATION (R4).
DO NOT MEASURE
BOOST 500V
HV TRANSFORMER TERMINAL BOARD
17DQ6 8CM7 8AW8A 8AW8A 6U8A 6AN8A 4DT6
17AX4GT 10ADP4 4BC5 6CL8A
90VAC 73VAC 65VAC 57VAC 49VAC 43VAC 37VAC
17VAC 23VAC 27VAC 33VAC
SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION
DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM.
ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (COUNTER-CLOCKWISE FROM SHAFT END)
WAVE FORMS TAKEN WITH CONTROLS SET TO PRODUCE 50 VOLTS PEAK-TO-PEAK SIGNAL AT PICTURE TUBE
1. DC voltage measurements taken with vacuum tube voltmeter; AC voltage measured at 1,000 ohms per volt.
2. Pin numbers are counted in a clockwise direction on bottom of socket.
3. Measured values are from ⏚ not pin to common negative unless otherwise stated.
4. Line voltage maintained at 117 volts for voltage readings.
5. All controls set for normal operation; no signal applied.

TUBE PLACEMENT CHART



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TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

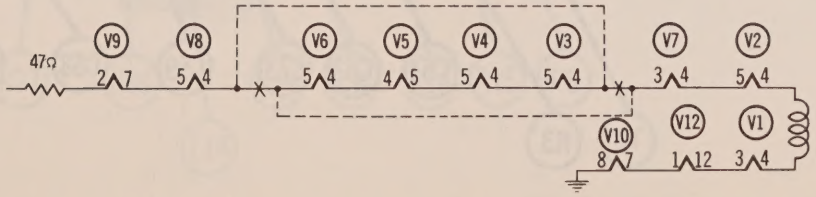
POWER SUPPLY FAILURE
No raster, no sound - Fusible Resistor (R61), Rectifier (M1, M2)

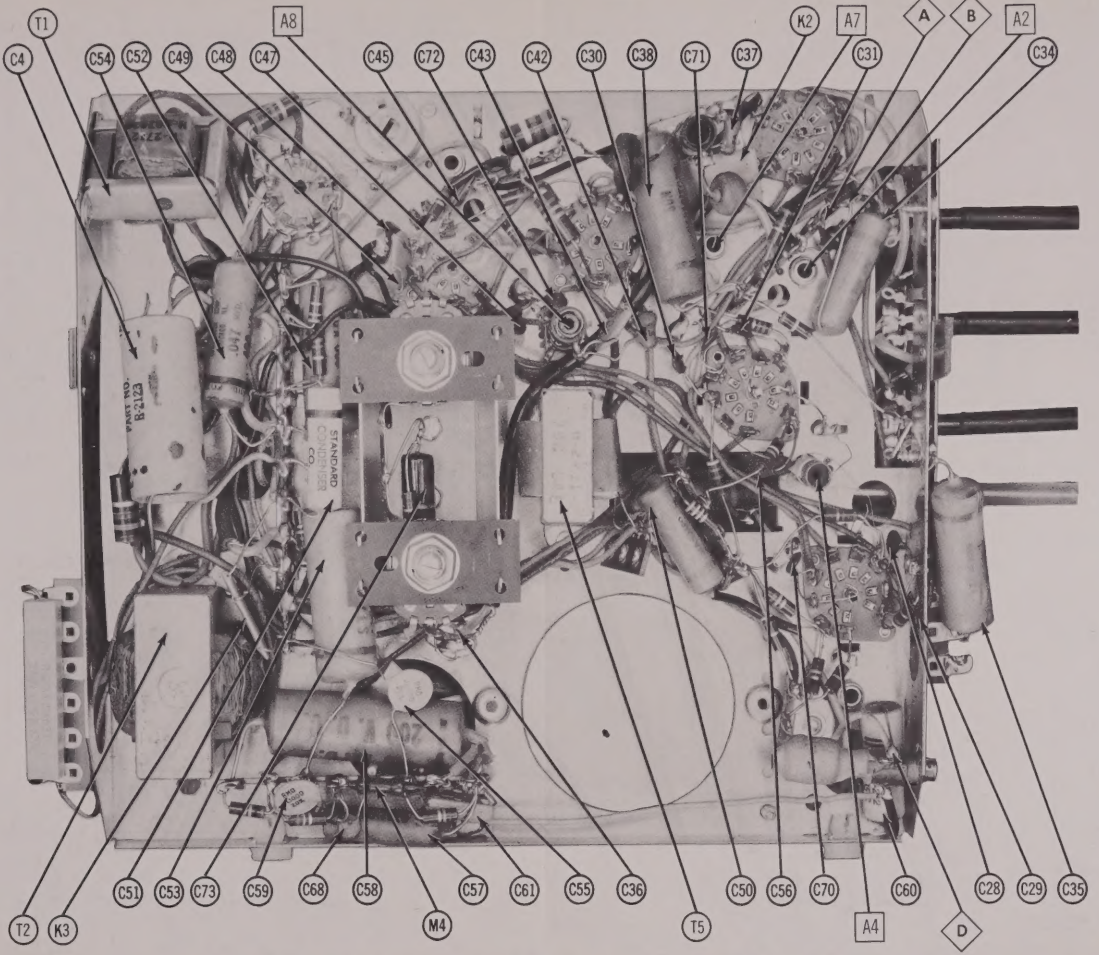
LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - V3, V4, Diode (M3), V5
No pic, no sound, has snow - V1, V2
No pic, has sound, has raster - V5, V12
Has pic, no sound - V6, V7

SYNC FAILURE
No vert. sync - V5, V3
No horiz. sync - V5, V3, Diode (M4)
No vert. or horiz. sync - V5, V3

SWEEP FAILURE
No raster, has sound - M4, V4, V9, V10, V11, V12
No vertical deflection - V8
Poor vert. linearity or foldover - V8
Poor horiz. linearity or foldover - V4, V9, V10
Narrow picture - V4, V9, V10, M1, M2
Vert. off freq. - V8
Horiz. off freq. - V4

This receiver employs tubes used in a series filament network, an open filament in any tube in the series will cause the set to be inoperative. (See circuit below).





CHASSIS BOTTOM VIEW-CAPACITOR AND ALIGNMENT IDENTIFICATION

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

USE AN ISOLATION TRANSFORMER TO PROTECT THE TEST EQUIPMENT.
The high voltage lead should be securely taped and kept away from the chassis.

VIDEO IF ALIGNMENT

Connect the negative lead of a 3 volt bias supply to point (A). Positive to chassis.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Direct	Place a thin insulated metal strip between the mixer-oscillator tube (V2) and tube shield. Connect the high side of sweep generator to the metal strip. Low side to chassis.	Not used	44.2MC	Any non-interfering channel	USE VTVM. DC probe thru 10K to point (B). Common to chassis.	A1, A2	Adjust for maximum deflection with slugs farthest apart. Use only enough generator output to provide a usable indication on VTVM.
2.	"	"	"	42.9MC	"	"	A3, A4	"
3.	"	"	"	42.5MC	"	"	A5	Adjust for maximum deflection.
4.	"	"	"	45.0MC	"	"	A6	"
5.	"	"	45.0MC (10MC Swp)	41.25MC 42.6MC 45.75MC	"	High side thru 10K to point (B). Low side to chassis.		Check for response curve similar to Fig. 1 with markers as indicated. If necessary, SLIGHTLY retouch A1 thru A6 for desired response.

SOUND IF ALIGNMENT

Disconnect video coupling capacitor (C8) from the junction of resistor R18 and coil L6.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
6.	Direct	High side to loose end of C34 (See instructions above). Low side to chassis.	4.5MC (400KC Swp)	4.5MC	Any non-interfering channel	Across volume control (R1).	A7, A8	Preset A9 counter clockwise until it no longer effects response. Adjust A7 and A8 for maximum response and symmetry similar to Fig. 2. Use only enough sweep generator output to provide a usable pattern on scope.
7.	"	"	"	"	"	"	A9	Increase generator output to just below overload. Adjust for response similar to Fig. 3. with marker at zero reference as shown. Restore circuit to normal.

ALTERNATE SOUND IF ALIGNMENT USING ON THE AIR SIGNAL

Turn the set on and tune in a strong TV signal. Adjust A9 for maximum sound output.
Reduce the signal strength by using an attenuator or similar device until a hiss is heard in the sound. Adjust A7 and A8 for maximum undistorted sound. Increase the signal strength and retouch A9 for maximum undistorted sound.

4.5MC TRAP ALIGNMENT

Tune in a TV station and adjust the fine tuning until sound bars just appear in the picture.
Turn A10 fully counter clockwise, then clockwise until the horizontal scanning lines are smooth and continuous.

VHF OSCILLATOR ALIGNMENT

1. Turn the set on and tune in the highest high band (7-13) channel operating in the area.
2. Set the fine tuning to the center of its range.
3. Adjust A11 for best picture.
4. Turn channel selector to the highest low band channel operating in the area.
5. Adjust A12 for best picture.

VHF RF AND MIXER ALIGNMENT FOR TUNER #R-2675

Attempt this alignment only if the proper equipment is available.
Connect bias as under "Video IF Alignment".
Tube shields must be extended during alignment.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough sweep generator output to provide a usable pattern on scope.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
8.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. thru 10K to point (C) Low side to chassis.	A13, A14	Adjust for maximum gain and symmetry of response similar to Fig. 4. with markers as shown. Adjust by expanding or compressing coil turns.
9.	"	"	207MC (10MC Swp)	205.25MC 209.75MC	12	"	A15, A16	"
10.	"	"	201MC (10MC Swp)	199.25MC 203.75MC	11	"	A17, A18	"
11.	"	"	195MC (10MC Swp)	193.25MC 197.75MC	10	"	A19, A20	"
12.	"	"	189MC (10MC Swp)	187.25MC 191.75MC	9	"	A21, A22	"
13.	"	"	183MC (10MC Swp)	181.25MC 185.75MC	8	"	A23, A24	"
14.	"	"	177MC (10MC Swp)	175.25MC 179.75MC	7	"	A25, A26	"
15.	"	"	85MC (10MC Swp)	83.25MC 87.75MC	6	"	A27, A28	"
16.	"	"	79MC (10MC Swp)	77.25MC 81.75MC	5	"	A29, A30	"
17.	"	"	69MC (10MC Swp)	67.25MC 71.75MC	4	"	A31, A32	"
18.	"	"	63MC (10MC Swp)	61.25MC 65.75MC	3	"	A33, A34	"
19.	"	"	57MC (10MC Swp)	55.25MC 59.75MC	2	"	A35, A36	"

Be sure to adjust the antenna coils until gain is maximum at midband. Antenna adjustments (A37 thru A48) will lower or raise sound side of curve, but should always be aligned for maximum gain at center of bandpass. On low channels there will be a small hump between markers. This is the antenna gain and should be placed in center of bandpass.

ALIGNMENT INSTRUCTIONS (cont)

VHF RF AND MIXER ALIGNMENT FOR UHF-VHF TUNER

Connect the negative lead of 1.5 volt bias supply to point Ⓐ . Positive to chassis.
Tube shields must be on tubes.
Attempt this alignment only if the proper test equipment is available.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough sweep generator output to provide a usable pattern on scope.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
20.	Two 120Ω Carbon Resistors	Across VHF antenna terminals with 120Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. thru 10K to point Ⓒ . Low side to chassis.	A49, A50, A51, A52	Adjust for maximum gain and symmetry of response similar to Fig. 4 with markers as shown. The plate coil increments effect the sound side of the response curve. The mixer grid coil increments effect the picture side of curve and the antenna coil increments effect the gain at the center of the curve. If after alignment both markers fall either outside or inside of the peaks of the response curve, the width of the band-pass response can be altered by adjusting capacitor lead (A52) with respect to the ground lead of the capacitor. Closing the coupling will widen the response and vice versa.
21.	"	"	207MC (10MC Swp)	205.25MC 209.75MC	12	"	A53, A54, A55	Adjust for maximum gain and symmetry of response similar to Fig. 4 with markers as shown. Adjust in same order as bove. That is, adjust plate coil first, then mixer grid coil, then bringing response curve to maximum midband gain by adjusting the antenna coil increments.
			201MC (10MC Swp)	199.25MC 203.75MC	11		A56, A57 A58	
			195MC (10MC Swp)	193.25MC 197.75MC	10		A59, A60, A61	
			187MC (10MC Swp)	187.25MC 191.75MC	9		A62, A63, A64	
			183MC (10MC Swp)	181.25MC 185.75MC	8		A65, A66, A67	
			177MC (10MC Swp)	175.25MC 179.75MC	7		A68, A69, A70	
22.	"	"	85MC (10MC Swp)	83.25MC 87.75MC	6	"	A71, A72 A73	The alignment of channels 6 thru 2 is accomplished in that order by adjusting the various coils for each channel. This time, however, the grid is adjusted first for the sound side of the curve, then the plate coil for the picture side and then the antenna coil for maximum midband gain. Do not move coils more than absolutely necessary to obtain desired response. Adjust for response similar to Fig. 5. The hump that appears between the markers represents the antenna response.
			79MC (10MC Swp)	77.25MC 81.75MC	5		A74, A75, A76	
			69MC (10MC Swp)	67.25MC 71.75MC	4		A77, A78, A79	
			63MC (10MC Swp)	61.25MC 65.75MC	3		A80, A81, A82	
			57MC (10MC Swp)	55.25MC 59.75MC	2		A83, A84, A85	

UHF OSCILLATOR ALIGNMENT

Turn VHF tuner to UHF position.
1. Tune in a station on the highest channel available (about 870MC).
2. Adjust A86 for best picture.
3. Tune in a station on the lowest channel available (about 470MC).
4. Adjust A87 for best picture.

Do not attempt any other adjustments on this UHF tuner.

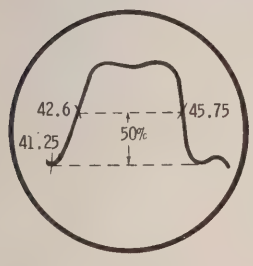


FIG. 1

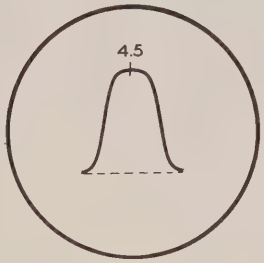


FIG. 2

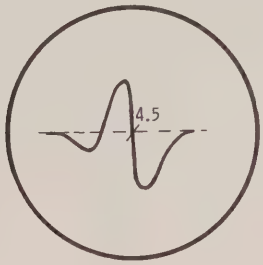


FIG. 3

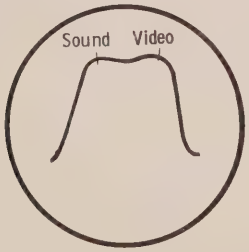


FIG. 4

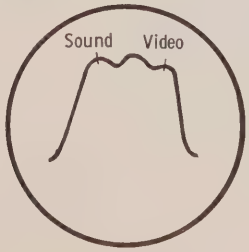
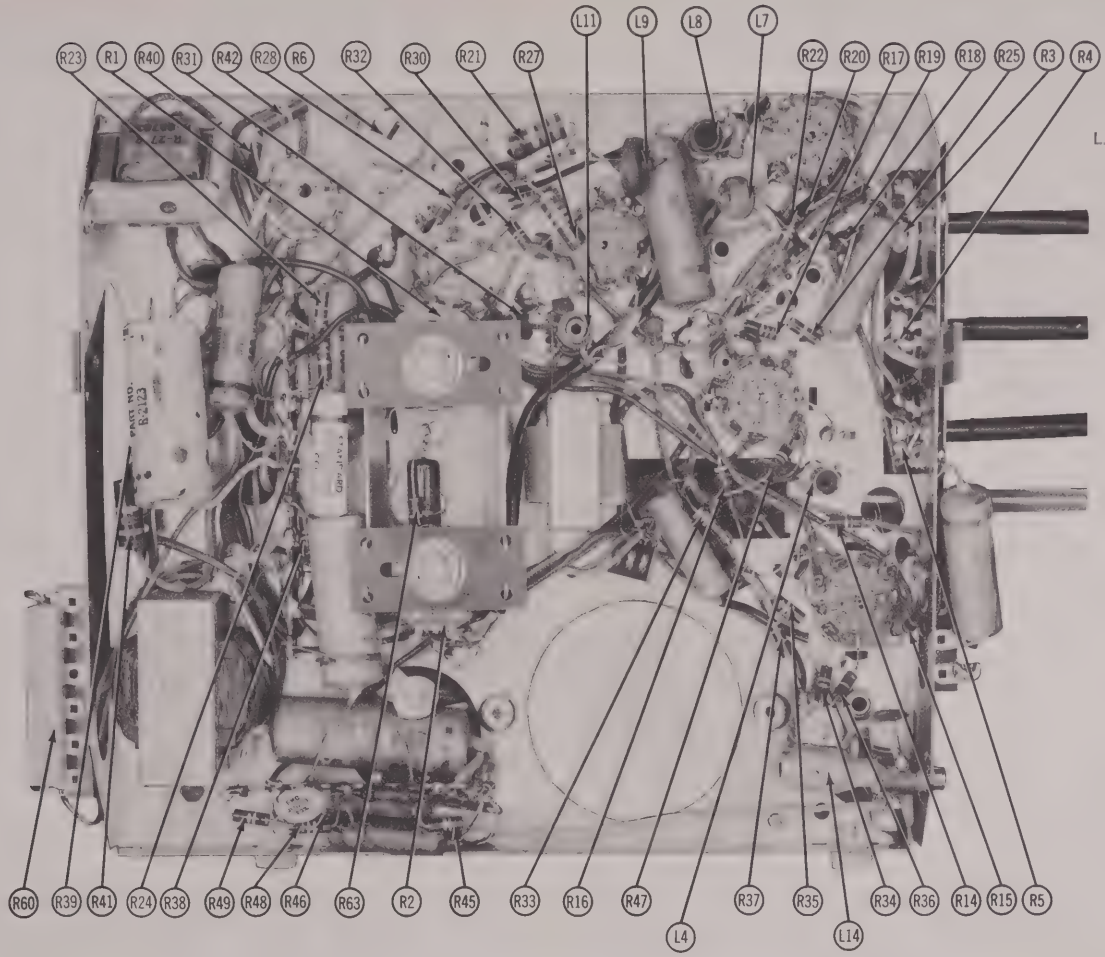


FIG. 5



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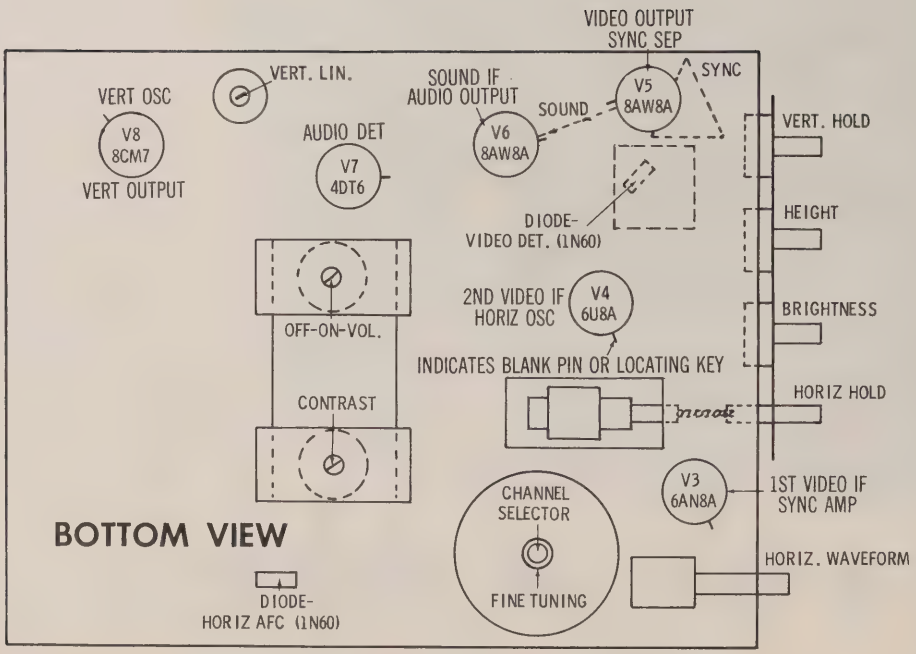
L. F. BLANKENSHIP
3924 MEADE St.
DENVER, COLORADO

CHASSIS BOTTOM VIEW-RESISTOR AND INDUCTOR IDENTIFICATION

RESISTANCE MEASUREMENTS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	4BC5	1Meg	0Ω	6Ω	7Ω	† 2700Ω	† 7500Ω	0Ω		
V2	6CL8A	15K	† 7500Ω	0Ω	7Ω	9Ω	† 5000Ω	2700Ω	0Ω	230K
V3	6AN8A	† 12K	18K	0Ω	12Ω	14Ω	† 2900Ω	† 2900Ω	1Meg	47Ω
V4	6U8A	‡235K	.1Ω	† 4200Ω	14Ω	16Ω	† 4200Ω	180Ω	0Ω	275K
V5	8AW8A	0Ω	2.2Meg	† 390K	19Ω	16Ω	• 230Ω	1Meg	† 2700Ω	† 4800Ω
V6	8AW8A	0Ω	56K	† 56K	19Ω	22Ω	220Ω	0Ω	† 2700Ω	† 570Ω
V7	4DT6	5.4Ω	820Ω	12Ω	9Ω	† 270K	† 3200Ω	560K		
V8	8CM7	‡5200Ω	NC	0Ω	22Ω	25Ω	• ‡400K	• 300K	2.2Meg	• 2400Ω
V9	17DQ6	NC	32Ω	NC	† 8200Ω	120K	TP	25Ω	0Ω	TOP CAP † 11Ω
V10	17AX4GT	NC	NC	¶	NC	† 50Ω	NC	4.5Ω	0Ω	
V11	1X2B	PINS 1 THRU 9 HAVE INFINITE RESISTANCE								TOP CAP ‡27Ω
V12	10ADP4	4.5Ω	1800Ω	PIN 6 † 50Ω	PIN 10 ‡56K	PIN 11 • 120K	PIN 12 6Ω			

† MEASURED FROM OUTPUT OF M2.
‡ MEASURED FROM PIN 3 OF V10.
• THIS READING WILL VARY. CONTROL SET FOR NORMAL OPERATION.
¶ THIS READING CAN VARY GREATLY, (10K MINIMUM), DUE TO THE CONDITION OF THE ELECTROLYTIC CAPACITOR CONNECTED IN THE ASSOCIATED CIRCUIT.
NC NO CONNECTION
TP TIE POINT



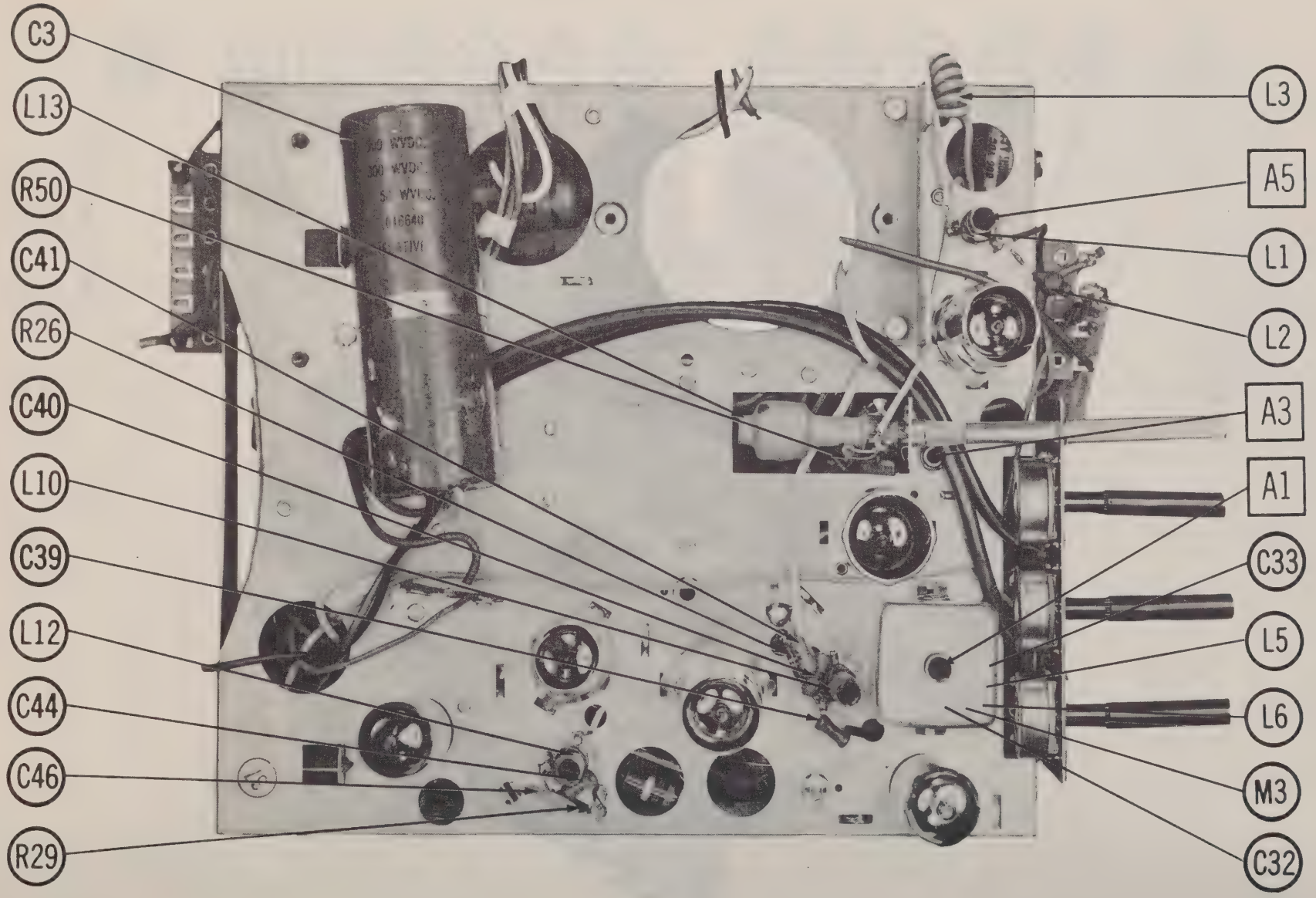
TUBE PLACEMENT CHART

L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

CHASSIS TOP VIEW

AIRLINE MODELS
GRX-4030A, GRX-4130A

FOLDER 1



CHASSIS-TOP VIEW

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

AIRLINE MODELS
GRX-4030A, GRX-4130A
RF TUNER-LEFT SIDE

FOLDER 1

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No	USE	TYPE	NOTES
V1	RF Amplifier	4BC5	
V2	Mixer-Oscillator	6CL8A	
V3	1st Video IF Amp - 9th Amp	8AN8A	
V4	2nd Video IF Amp - Horiz. Osc.	6U8A	
V5	Video Output - Sync Sep.	8AW8A	

ITEM No	USE	TYPE	NOTES
V6	Sound IF Amp Audio Output	8AW8A	
V7	Audio Detector	4DT8	
V8	Vert. Osc. - Vert. Output	6CM7	
V9	Horiz. Output	17DQ8	
V10	Damper	17AX4GT	
V11	HV Rectifier	1X2B	

PICTURE TUBE

ITEM No	REPLACEMENT DATA			NOTES
	AIRLINE PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	
V12	19ADP4			

ELECTROLYTIC CAPACITORS

ITEM No	RATING		REPLACEMENT DATA						
	CAP.	VOLT	AIRLINE PART No.	AEROVOX PART No.	CORNELL DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1	200	150	R-2696 ① ②	PRS150V200	BR20015	WS242	TD-200-150	S-110	TVA-1423
C2	140	300	R-2695 ② ③	PRJ-100	BRK00334	WS427	TMD-34	S-200	
C3A	100	150	R-2697 ② ④	PRJ-047		WT430		AJ-212, MTD-4530	
B	60	300							
C	100	50							
C4	10	300	R-2123	PRS350V10	BR1045	TC82	TD-10-450	MT- 4510	TVA-1604

① Alternate part number R-2138.
② Alternate part number R-2133.
③ Alternate part number R-2127.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA								NOTES
	CAP.	VOLT	AIRLINE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.		
C5	12										
C6	1000			EF-001		MFT-1000			503C-DI		
C7	8			SI 5		DD-050	L10V5	ED-5	2T-555	SGA-V5	
C8	1000			BPD-001		DD-103	BYA5DI	ED-1000	DC5DI	5HK-DI	
C9	1000			EF-001		MFT-1000				503C-DI	
C10	.34										
C11	1.5			NPO-SI 1 5	TCZ-1R5	C10V15C	TCO-1 5		2T-5515	5TCCB-V15	
C12	47			NT50-DI 47	TCN-47	C10Q47U	TCT-47		NT-5447	5TCU-Q47	N750 5%
C13	.34										
C14	1.5										
C15	75			BPD-000015	DD-150	L10Q15 C10V2C	ED-15		UC-5415	5GA-Q15	
C16	3.0										
C17	100										
C18	1000			BPD-001	DD-102	BYA5DI	ED-1000		DC5DI	5HK-DI	
C19	130										
C20	1.5										N2200
C21	10										N1500
C22	1000			EF-001		MFT-1000				503C-DI	
C23	1000			BPD-001		DD-102	BYA5DI	ED-1000	DC5DI	5HK-DI	
C24	1000			BPD-001		DD-102	BYA5DI	ED-1000	DC5DI	5HK-DI	
C25	1000			R-1447		DD-102	BYA5DI	ED-1000	DC5DI	5HK-DI	
C26	1000			R-1447		BPD-001	BYA5DI	ED-1000	DC5DI	5HK-DI	
C27	1000			R-1447		BPD-001	BYA5DI	ED-1000	DC5DI	5HK-DI	
C28	1000			R-1447		BPD-001	BYA5DI	ED-1000	DC5DI	5HK-DI	
C29	1000			R-1447		BPD-001	BYA5DI	ED-1000	DC5DI	5HK-DI	
C30	1000			R-1447		BPD-001	BYA5DI	ED-1000	DC5DI	5HK-DI	
C31	1000			R-1447		BPD-001	BYA5DI	ED-1000	DC5DI	5HK-DI	
C32	1000			R-1447		BPD-001	BYA5DI	ED-1000	DC5DI	5HK-DI	
C33	4.7			R-1440		NPO-SI 4.7	TCZ-4R7	C10V47C	TCO-4.7	2T-5547	5TCCB-V47	NPO
C34	047	300		R-1483		BPD-05		CUB2S47		GEM-4147	2TM-S47	
C35	.33	300		R-1485		P388N-33		CUB3P33		GEM-3033	2TM-P33	
C36	100			N-5015		DS-101		LT5T1	GP-100	UC-531	5GA-T1	
C37	100			N-5049		NPO-SI 22	TCZ-22	CTA5Q22C	TCO-22		5TCCC-Q22	NPO 10%
C38	.1	600		N-1833		P468N-1		CUB4P1		GEM-401	4TM-P1	
C39	3			R-1104		NPO-SI 3.0			TCO-3	2T-553		NPO 10%
C40	68			N-7944		NPO-SI 68	D6-680	L10Q68	ED-68		5TCC-Q68	10%
C41	47			R-1443		SI 47	D6-470	L10Q47	ED-47	UC-5447	5GA-Q47	
C42	8.2			R-1441		NPO-SI 8.2	TCZ-8R2		TCO-8.2			NPO 10%
C43	10000			BPD-01		DD-103	BY A5DI		ED-01	DC5II	5HK-SI	
C44	18			R-2177		TCZ-18	CTA5Q18C		TCO-18			NPO 5%
C45	5000			N-5273		BPD-005	DD-503	BYA10D5	ED-005	DC5J5	5HK-D5	
C46	5000			N-5062		BPD-01	DD-103	BYA5DI	ED-01	DC5II	5HK-SI	
C47	1000			R-1447		BPD-001	DD-102	BYA5DI	ED-1000	DC5II	5HK-DI	
C48	1000			R-1447		BPD-001	DD-102	BYA5DI	ED-1000	DC5II	5HK-DI	
C49	10000			N-5063		BPD-01	DD-103	BY A5DI	ED-01	DC5II	5HK-SI	
C50	047	300		R-1483		BPD-05	DF-503	CUB2S47		GEM-4147	2TM-S47	
C51	.01	600		R-1450		BPD-01	DD-103	CUB6S1	ED-01	GEM-601	6TM-SI	
C52	.1	600		N-7798		P688N-1	DF-104	CUB6P1		GEM-601	6TM-P1	
C53	.22	400		R-1486		P468N-22		CUB4P22		GEM-4022	4TM-P22	
C54	047	600		R-1483		BPD-05	DF-505	CUB4F47		GEM-4147	4TM-F47	
C55	1000			R-1447		BPD-001	DD-103	BY A5DI	ED-1000	DC5II	5HK-DI	
C56	270			R-1439		1688-00027		MT-2S7			10K	
C57	.022	400		R-1481		BPD-03	DD-303	CUB4S22		GEM-4122	4TM-S22	
C58	.5	300		R-2696		P388N-5		CUB3P5		GEM-305	3TM-P5	
C59	1000			R-1447		BPD-001	DD-103	BY A5DI	ED-1000	DC5II	5HK-DI	
C60	.01	600		R-1450		BPD-01	DD-103	CUB6S1	GP-10000	GEM-611	6TM-SI	
C61	68			R-2642		1684-00068		MS-2S8			MS-2S8	10%
C62	.22	600		R-2188		P688N-22		CUB6P22		GEM-6022	6TM-P22	
C63	5000			N-4372		BPD-005	DD-503	BYA10D5	ED-005	DC5J5	5HK-D5	
C64	047	400		R-1482		BPD-05	DF-505	CUB4F47		GEM-4147	4TM-S47	
C65	.22	600		R-2188		P688N-22		CUB6P22		GEM-6022	6TM-P22	
C66	.0022	600		R-2301		BPD-0022	D6-222	CUB6U22	GP-2200	GEM-6222	6TM-U22	
C67	.1	200		N-1251		P388N-1	DF-104	CUB3P1		GEM-401	3TM-P1	
C68	1000	1500		R-1449		EVD-10-1000	D2D0-102	HVB1S2	HD5-1000	DC5D2	2DGA-DI	
C69	.1	400		R-2577		P488N-1	DF-104	CUB4P1		GEM-401	4TM-P1	
C70	1000			R-1447		BPD-001	DD-102	BYA5DI	ED-1000	DC5II	5HK-DI	
C71	1000			R-1447		BPD-001	DD-102	BYA5DI	ED-1000	DC5II	5HK-DI	
C72	1000			R-1447		BPD-001	DD-102	BYA5DI	ED-1000	DC5II	5HK-DI	
C73	.01	600		N-9439		BPD-01	DD-103	CUB6S1	GP-10000	GEM-611	6TM-SI	

CONTROLS

ITEM No	RATING		REPLACEMENT DATA				INSTALLATION NOTES
	RESISTANCE	WATTS	AIRLINE PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	MALLORY PART No.	
R1A	500K	1	R-2706	AB-50	A47-500K-Z	Q33-133	Volume
B	Shaft			AK-7	FS-3	Not Req.	Not Req.
C	Switch			KS-1	SWE-12	TS-1	US-28
R2A	1000Ω	1	R-2707	AB-305		Q37-108	U3
B	Shaft			AK-7		Not Req.	Not Req.
R3A	500K	1	R-2705	AB-249	A47-500K-S	Q31-133	PTA5SL Vert. Hold
B	Shaft			AK-19	RN-3	TQ	Not Req.
R4A	5Meg	1	R-2704	AB-87	A47-5Meg-S	Q31-141	TA5SL Height
B	Shaft			AK-19	RN-3	TQ	Not Req.
R5A	100K	1	R-2708	AB-40	A47-100K-S	Q31-128	PTA5L Brightness
B	Shaft			AK-19	RN-3	TQ	Not Req.
R6	5000Ω	2	R-2046		39-5000		Vert Lin - wire wound

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	AIRLINE PART No.	IRC PART No.	
R7	12K			BTS-12K	
R8	4700Ω			BTS-4700	
R9	10K			BTS-10K	
R10	330K			BTS-330K	
R11	2200Ω			BTS-2200	
R12	4700Ω			BTS-4700	
R13	15K			BTS-15K	
R14	150Ω		N-1380	BTS-150	
R15	47Ω		N-4327	BTS-47	
R16	470Ω		N-4331	BTS-470	
R17	180Ω		N-4067	BTS-180	
R18	6800Ω		N-4693	BTS-6800	
R19	13Meg		N-1383	BTS-13Meg	
R20	13Meg		N-1382	BTS-13Meg	
R21	4700Ω	3	N-7018	BTS-4700	
R22	100Ω		N-1618	BTS-100	
R23	3300Ω		N-4716	BTS-3300	
R24	1800Ω		N-4281	BTS-1800	
R25	100K		N-1778	BTS-100K	
R26	56K		N-4683	BTS-56K	
R27	56K	1	N-7014	BTA-56K	
R28	270K		N-7004	BTS-270K	
R29	560K		N-7190	BTS-560K	
R30	470Ω		N-4031	BTS-470	
R31	820Ω		N-4379	BTS-820	
R32	330Ω		N-4034	BTS-330	
R33	390K		N-8035	BTS-390K	
R34	33K		N-8013	BTS-33K	
R35	560K		N-7190	BTS-560K	

ITEM No	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	AIRLINE PART No.	IRC PART No.	
R36	4700Ω		N-4278	BTS-4700	
R37	4700Ω		N-4278	BTS-4700	
R38	270K		N-7004	BTS-270K	
R39	470K		N-4027	BTS-470K	
R40	2.2Meg		N-4277	BTS-2.2Meg	
R41	2700Ω	3	N-7128	BTS-2700	
R42	820Ω	1	N-9016	BTA-820	
R43	680Ω		N-1454		
R44	680Ω		N-1454		
R45	22K		N-8012		
R46	120K		N-2009		
R47	100K		N-1973		
R48	56K		N-4823		
R49	10K		N-4695		
R50	47K		N-7124		
R51	180K		N-7003	BTS-180K	
R52	56K		N-4822	BTS-56K	
R53	47Ω		N-7187	BTS-47	
R54	120K		N-2008	BTS-120K	
R55	8200Ω	7	R-3769	PW10-8200	
R56	150K	1	N-9017	BTA-150K	
R57	180K	1	N-9017	BTA-180K	
R58	150K	1	N-9017	BTA-150K	
R59	5600Ω		N-7400		
R60	2700Ω	10	R-2124		
R61	5.5Ω	5	R-1409	FR5.6	
R62	47Ω	10	R-2699		
R63	220K		N-4026	BTS-220K	

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No	USE	REPLACEMENT DATA							
		AIRLINE PART No.	Halldorson PART No.	Merit PART No.	RCA TYPE No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	Vert Osc	R-2713	B6703 ①	A-3003 ①	20V21 ①	V40S ①	A-8136 ①	28A08 ①	A-97X ①
T2	Vert Output	R-2700							
T3A	Yoke-Horiz (23MH)	R-2688					DY-25A ②		
B	(90°)-Vert (1.4MH)								
T4	Horiz Output	R-2684							

① Drill new mounting hole(s).
② Use original rear cover and centering device. Use original damping network, if necessary.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	AIRLINE PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T5	10K	3-4Ω	R-2711	B1118 ①	A-2999	A-3981 ①	34S54 ①	S-61X ①	① Drill one new mounting hole

SPEAKER

ITEM No	TYPE				REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.		AIRLINE PART No.	QUAM PART No.	
SP1	4"	PM	3-4Ω		R-2703	4A06	

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA					NOTES
		AIRLINE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.		
L1	1st. Video IF	R-3063		TV-131	6238		
L3	RF Choke	R-1431		18-8022 *			35 Microhenries, wound on 4700Ω resistor
L3	B+ Choke	R-1870		19-1001	BC-582	4804	1.6 Microhenries
L4	2nd. Video IF	R-2701		17-4522	TV-130	6249	
L5	3rd. Video IF	R-3065		17-4534	TV-130	6249	
L6	Series Peaking Coil	R-1470		19-3088	TV-132	6177	88 Microhenries
L7	Series Peaking Coil	R-1950			TV-190 ▲	6153 ▲	395 Microhenries, wound on 12K resistor
L8	4.5MC Trap	N-9011		20-1004	TV-151	1470	
L9	Shunt Peaking Coil	R-1949		19-3100 *			1140 Microhenries, wound on 4700Ω resistor
L10	1st. Sound IF	R-1835		17-3400	TV-131	1469	
L11	2nd. Sound IF	R-2150					
L12	Quadrature Coil	R-2159		20-1005	TV-121	1480	

* Parallel with 4700Ω resistor. ▲ Parallel with 12K resistor. * Parallel with 10K resistor.

TRANSFORMER (HORIZ. OSC.)

ITEM No.	DC RES		REPLACEMENT DATA						NOTES
	PRI.	SEC.	AIRLINE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	RCA TYPE No.	Ram PART No.	Thordarson PART No.	
L13	67Ω *		R-1405		TV-168				28S-7	10-67.5 Millihenries Horiz. Freq
L14	38Ω		R-1405		TV-168 ▲				28S-8	5-13.5 Millihenries Horiz. Waveform

* Tapped @ 46Ω ▲ Enlarge mounting hole.

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA					
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE @ CURRENT 1000 ℄	AIRLINE PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L15	170A	50Ω	9H MY.	R-3056	CB04①	C-2998 ①	C-3318 ①	28C04 ①	C-34X

① Drill one new mounting hole.

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	AIRLINE PART No.	REPLACEMENT DATA	
K1	Ant. Isolation	470MMF @ 1500V, 220K 10%			
K2	Sync Coupler	270MMF, 10000MMF, 25MMF, 10K, 330K, 2.5Meg	R-1459	Centralab Sprague	PC-380 ST-1
K3	Vert. Integrator	470MMF, 4700MMF, 22K, 10K	R-1458	Centralab	PC-106

RECTIFIERS

ITEM No	RATING		REPLACEMENT DATA					NOTES
	CURRENT (Mercuric)	PEAK INV. VOLT	AIRLINE PART No.	FEDERAL PART No.	GENERAL ELECTRIC PART No.	INTERNATIONAL PART No.	SARKES TARZIAN PART No.	
M1	170A		R-2147 ①	1028A ①	1N1005 ②	6RS250 ②	250A ②	① Selenium type.
M2	170A		R-2147 ①	1028A ①	1N1005 ②	6RS250 ②	250A ②	② Germanium type.

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA			NOTES
		AIRLINE PART No.	CBS PART No.	SYLVANIA PART No.	
M3	*1N60		1N60	1N60	Video Det. (Pigtail)
M4	†1N60		1N60	1N60	Horiz. AFC (Pigtail)

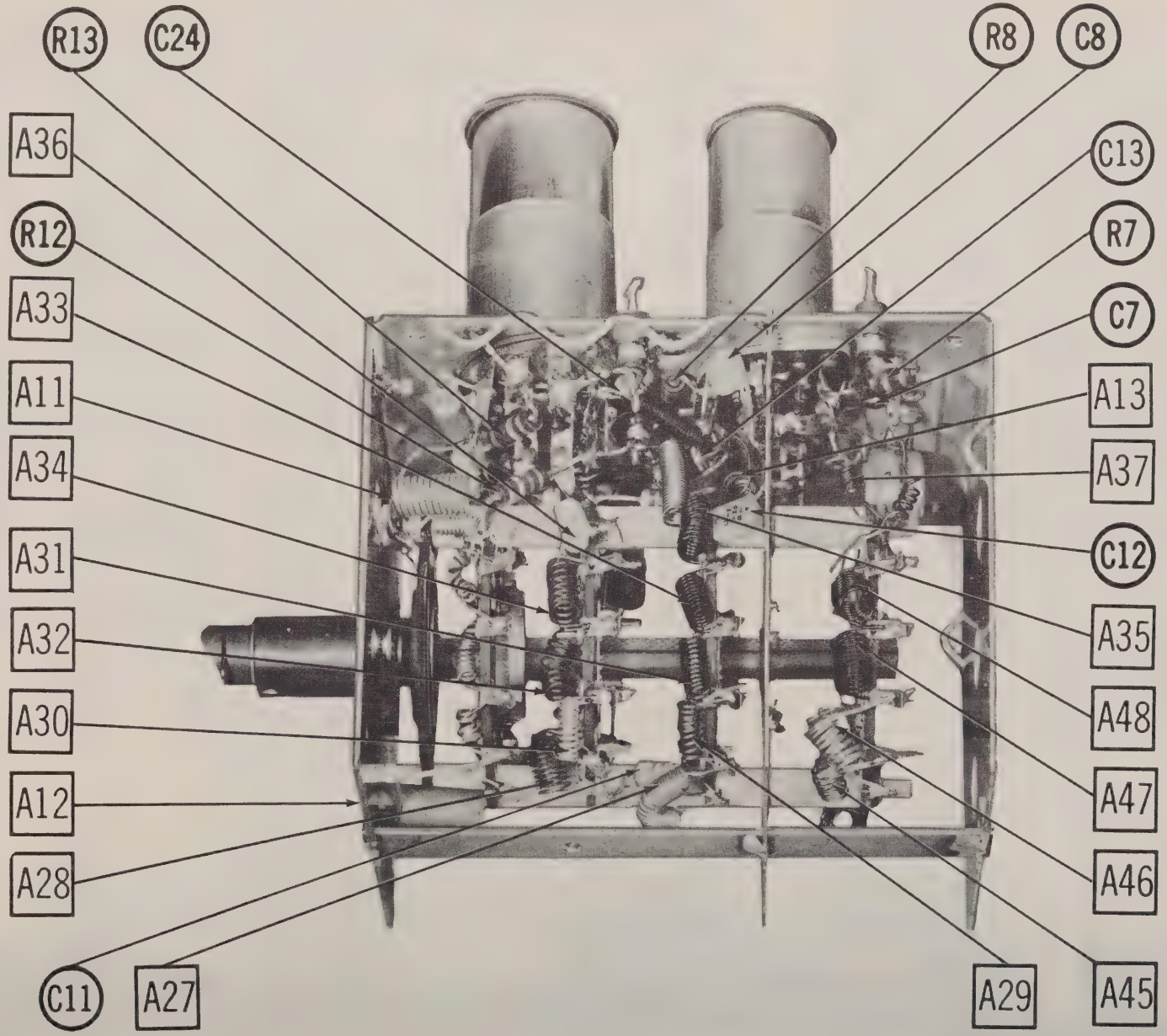
* A 1N64 may be used in some versions.
† A selenium diode (Part #R-2141) may be used in some versions.

MISCELLANEOUS

ITEM No.	PART NAME	AIRLINE PART No.	NOTES
M5	Tuner	R-3075	VHF (Sarkes Tarzian #TT-34)
	Tuner		UHF-VHF (Sarkes Tarzian #U-17V15A)
M6	Centering Device	R-2687	Includes yoke rear cover
M7	Ion Trap	R-2044	

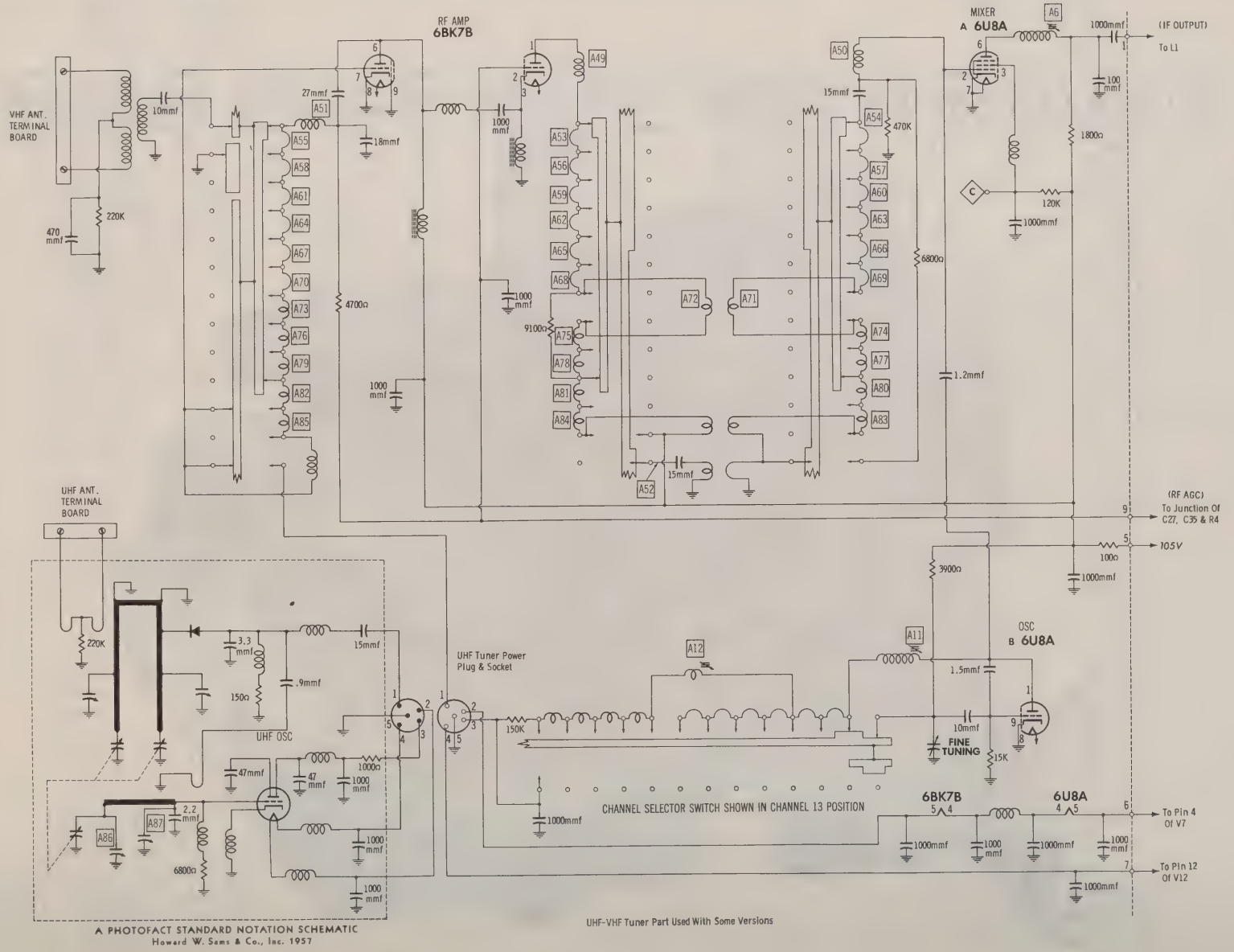
CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)



RF TUNER-RIGHT SIDE

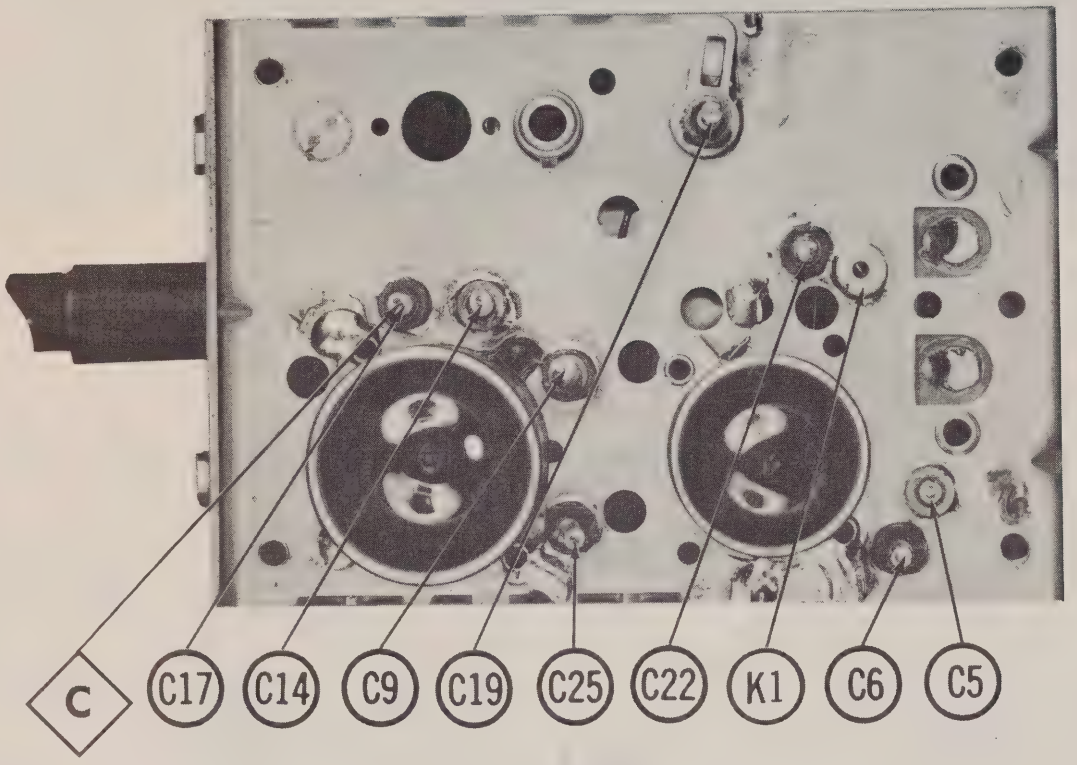
CHASSIS-BOTTOM VIEW



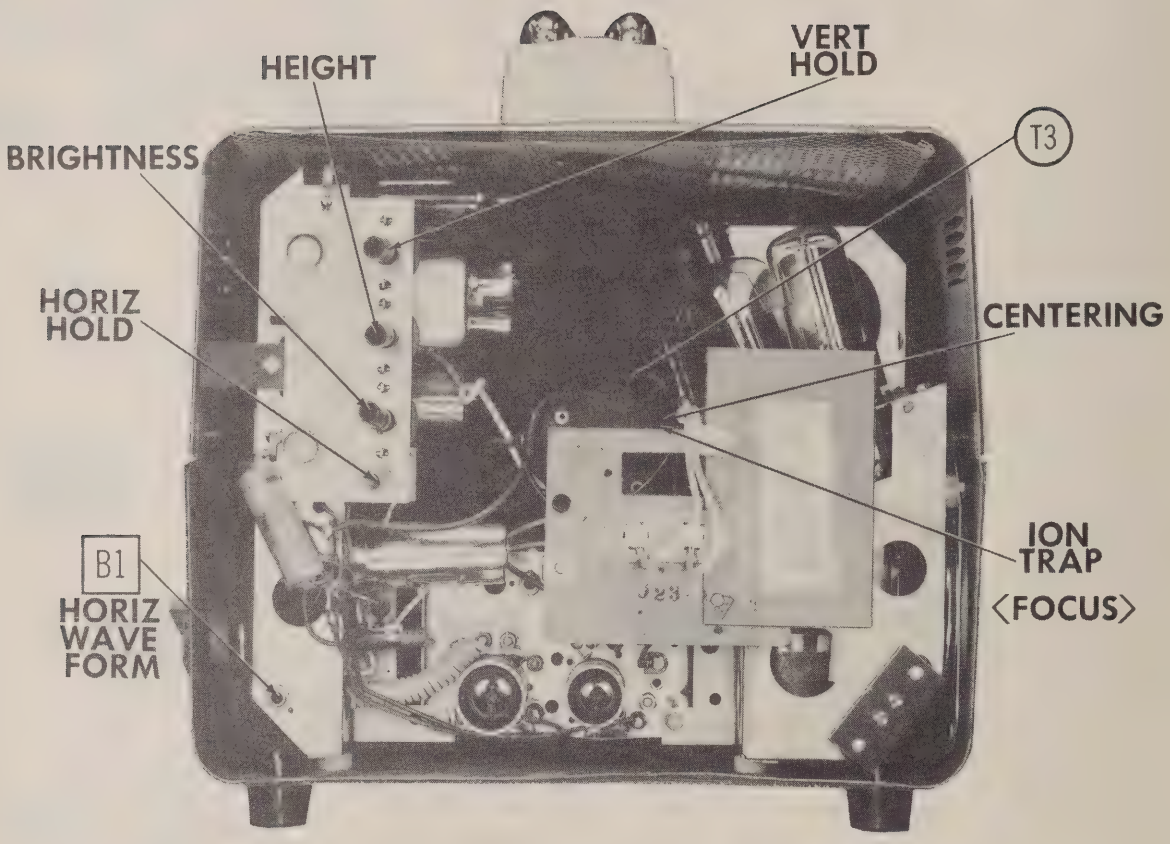
A PHOTOFACT STANDARD NOTATION SCHEMATIC
Howard W. Sams & Co., Inc. 1957

UHF-VHF Tuner Part Used With Some Versions

ALTERNATE TUNER SCHEMATIC



RF TUNER-TOP VIEW



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably with a test pattern.

Adjust horizontal hold until the picture synchronizes horizontally.

Connect the vertical amplifier of the scope thru a low capacity probe to point ⟨D⟩. Adjust waveform slug (B1) to obtain response curve similar to Fig. 6 with sharp and broad peaks of equal amplitude. Keep picture in sync during this adjustment with B1.

Check sync pull-in by switching off channel and back again. Retouch horizontal hold if necessary for proper operation.

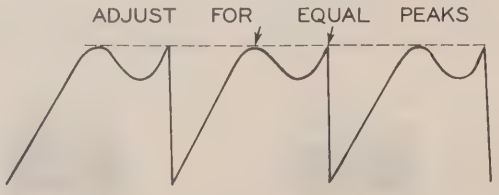


FIG. 6

PHOTOFACT* Folder

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MODEL TV2-9418A

CORONADO MODELS TV2-9414A, B, TV2-9415A, B, TV2-9416A, B, TV2-9417A, B, TV2-9418A, B, TV2-9419A, B, TV2-9420A, B, TV2-9421A, B, TV2-9422A, TV2-9423A, TV2-9424A, TV2-9425A

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FOLDER 2

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*TRADE MARK

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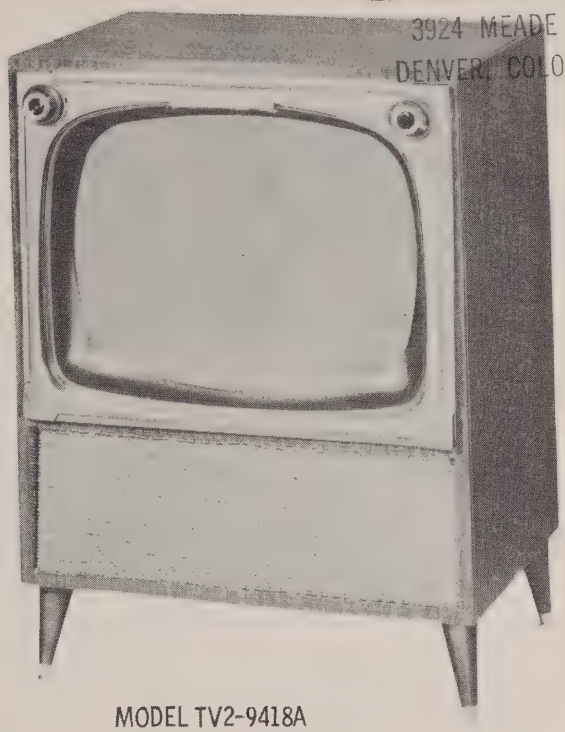

MODEL TV2-9418A

DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

1. Remove 4 wood screws and the rear cover.
2. Remove 2 speaker leads.
3. Remove the antenna terminal board by loosening 2 wood screws.
4. Remove 2 metal screws holding the top of the chassis to the rear of the cabinet.
5. Remove 2 metal screws from inside the cabinet, holding the bottom of the chassis to 2 lower brackets.
6. Remove chassis by sliding out from the front of the cabinet.
7. Remove 4 speaker nuts and the speaker.

CAUTION NOTE

ONE SIDE OF AC LINE CONNECTED TO CHASSIS

TRADE NAME	Coronado	MODELS	TV2-9414A, B, TV2-9415A, B, TV2-9416A, B, TV2-9417A, B, TV2-9418A, B, TV2-9419A, B, TV2-9420A, B, TV2-9421A, B, TV2-9422A, TV2-9423A, TV2-9424A, TV2-9425A
SUPPLIER	Gamble-Skogomo, Inc., 15 North 8th. St., Minneapolis, Minn.		
TYPE SET	Television Receiver		
TUBES	Sixteen		
POWER SUPPLY	110-120 Volts AC, 60 Cycle		RATING 155 Watts, 1.35 Amp. @ 117 Volts AC
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)		

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustment of the VHF oscillator is possible by removing the channel selector and fine tuning knobs. Set the fine tuning at the center of its range. The adjustments are accessible, one at a time, as the channel selector is rotated. Adjust for best picture and sound.

PICTURE TUBE SAFETY GLASS CLEANING

1. Remove the name plate by pulling straight out.
2. Remove 2 metal screws and the retainer bracket.
3. Remove the safety glass.

FOCUS

Adjust the ion trap for the best focus consistent with maximum brightness.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Set the horizontal hold control to the center of its range and adjust the horizontal frequency slug (B1) until the picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate audio detector buzz, adjust the buzz control for MINIMUM buzz and maximum sound. (For location see tube placement chart).

FUSES

A thermal circuit breaker is used for LV power supply protection and may be closed by means of a reset button. (For location, see tube placement chart).

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube. Rotate the two rings around the neck of the tube until the picture is properly centered.

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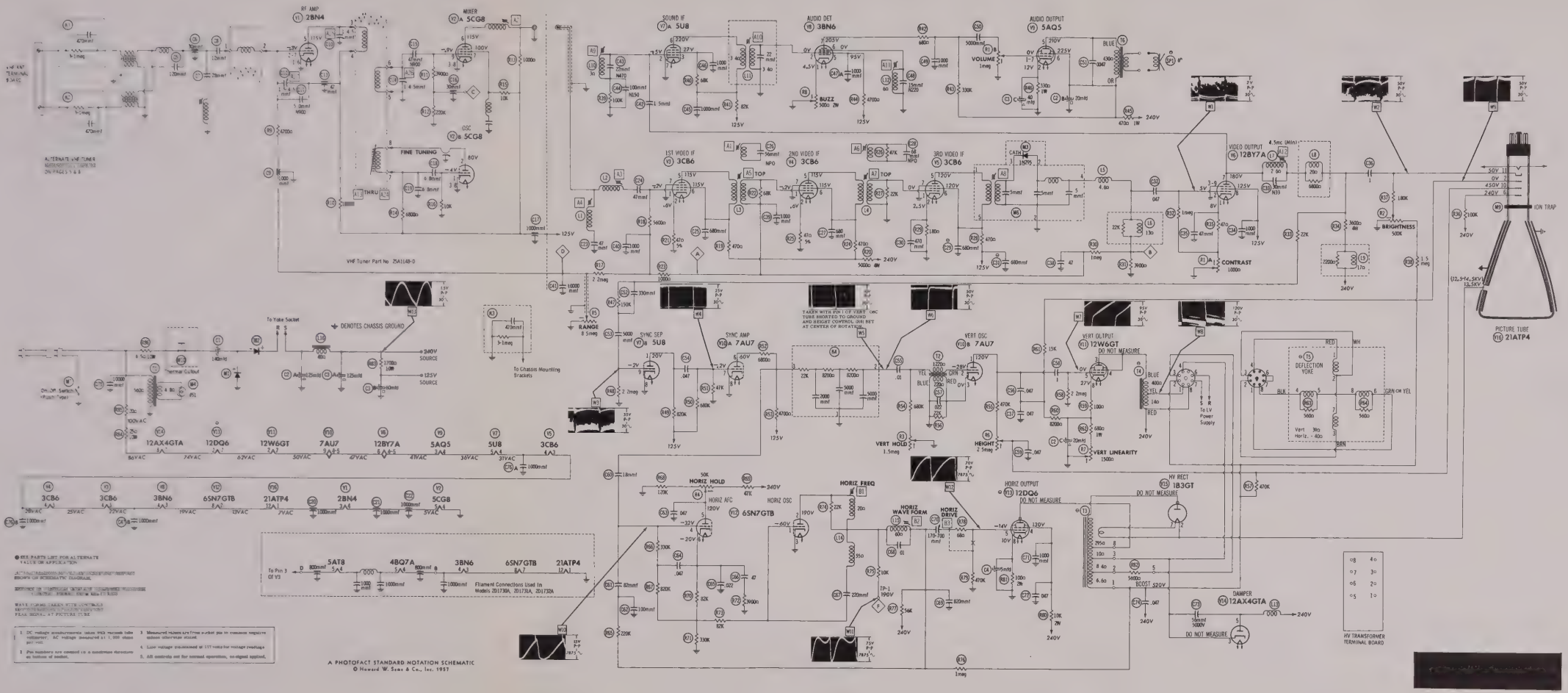
G921R

DATE 11-57 SET 379 FOLDER 2


RF AMP
2BN4
MIXER
5CG8
OSC
5CG8
FINE TUNING
SOUND IF
5U8
AUDIO DET
3BN6
AUDIO OUTPUT
5AQ5
VOLUME
1meg
1ST VIDEO IF
3CB6
2ND VIDEO IF
3CB6
3RD VIDEO IF
3CB6
VIDEO OUTPUT
12BY7A
CONTRAST
1000Ω
BRIGHTNESS
500K
ION TRAP
PICTURE TUBE
16 21ATP4
VHF Tuner Part No 25A1148-D
SYNC SEP
5U8
SYNC AMP
7AU7
VERT OSC
7AU7
VERT OUTPUT
12W6GT
DO NOT MEASURE
VERT HOLD
1.5meg
HEIGHT
2.5meg
VERT LINEARITY
150Ω
DEFLECTION YOKE
HORIZ OSC
6SN7GTB
HORIZ AFC
HORIZ HOLD
50K
HORIZ FREQ
HORIZ WAVE FORM
HORIZ DRIVE
HORIZ OUTPUT
12DQ6
DO NOT MEASURE
HV RECT
1B3GT
DO NOT MEASURE
DAMPER
12AX4GTA
BOOST
DO NOT MEASURE
HV TRANSFORMER TERMINAL BOARD
RANGE
8.5meg
To Yoke Socket
DENOTES CHASSIS GROUND
Thermal Cutout
ON-OFF Switch
To Chassis Mounting Brackets
240V SOURCE
125V SOURCE
12AX4GTA
12DQ6
12W6GT
7AU7
12BY7A
5AQ5
5U8
3CB6
3CB6
3BN6
6SN7GTB
21ATP4
2BN4
5CG8
5AT8
4BQ7A
3BN6
6SN7GTB
21ATP4
Filament Connections Used In Models 21D173RA, 21D173LA, 21D175DA
A PHOTOFACT STANDARD NOTATION SCHEMATIC
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TUBE PLACEMENT CHART

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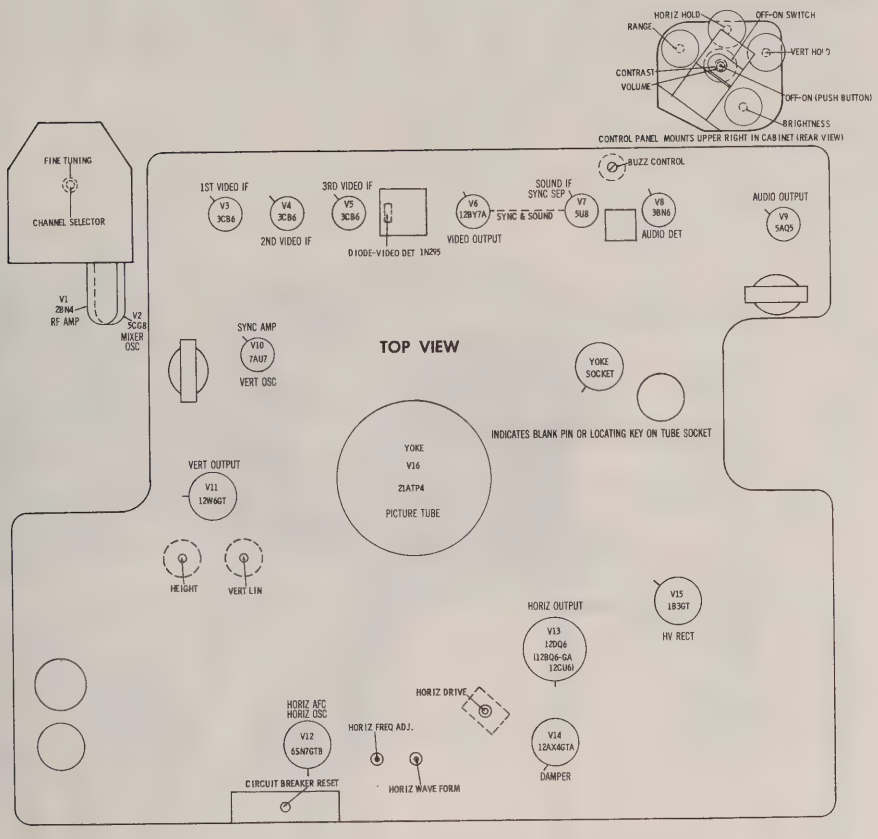


TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

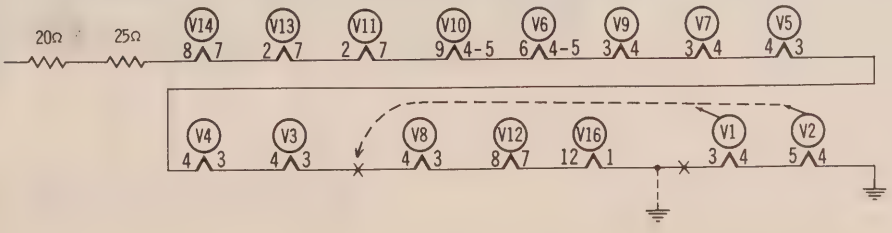
POWER SUPPLY FAILURE
No raster, no sound - **Circuit Breaker (M10), Rectifier (M1, M2)**

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - **V3, V4, V5, Diode (M3), V6**
No pic, no sound, has snow - **V1, V2**
No pic, has sound, has raster - **V6, V16**
Has pic, no sound - **V7, V8, V9**

SYNC FAILURE
No vert. sync - **V7, V10**
No horiz. sync - **V7, V10, V12**
No vert. or horiz. sync - **V7, V10**

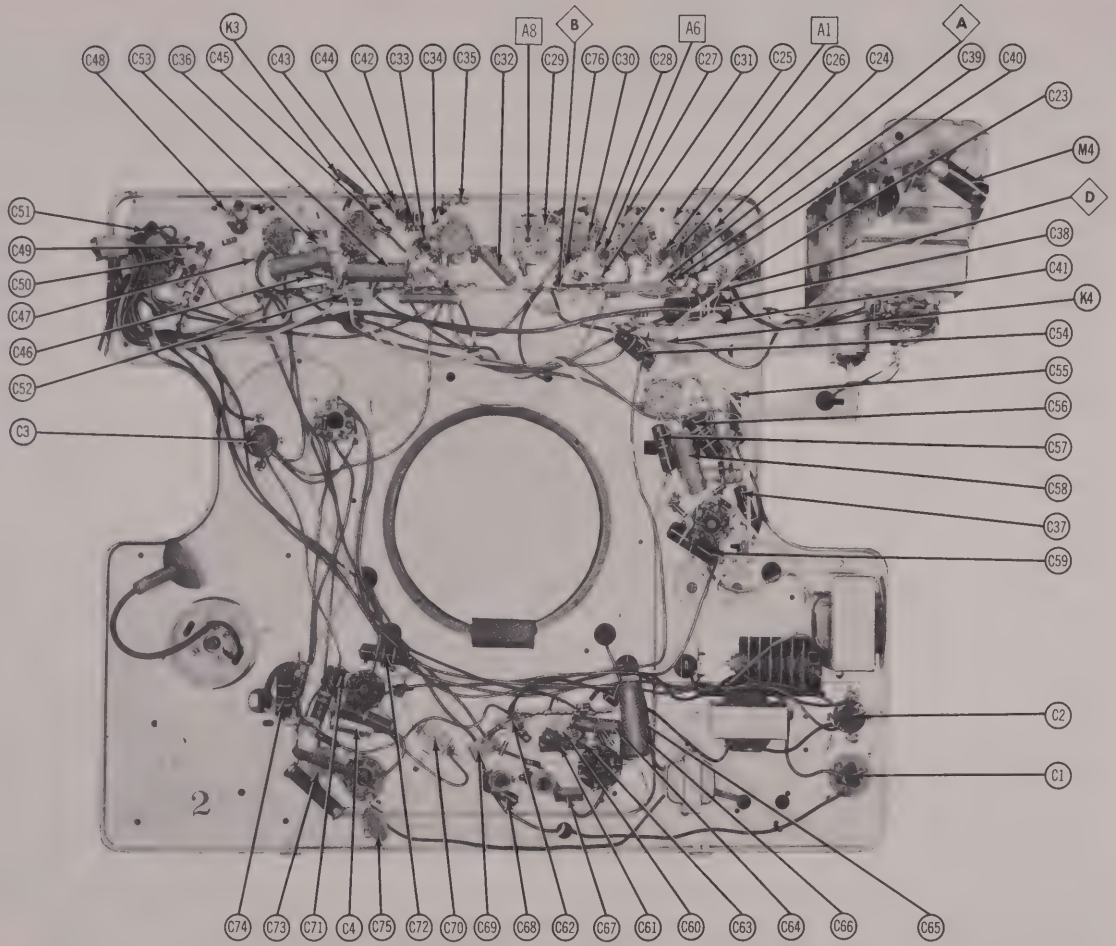
SWEEP FAILURE
No raster, has sound - **V12, V13, V14, V15, V16**
No vertical deflection - **V10, V11**
Poor vert. linearity or foldover - **V10, V11**
Poor horiz. linearity or foldover - **V12, V13, V14**
Narrow picture - **V12, V13, V14, M1, M2**
Vert. off freq. - **V10**
Horiz. off freq. - **V12**

This receiver employs tubes used in a series filament network, an open filament in any tube in the series will cause the set to be inoperative.(See circuit below).



CORONADO MODELS TV2-9414A, B, TV2-9415A, B, TV2-9416A, B, TV2-9417A, B, TV2-9418A, B, TV2-9419A, B, TV2-9420A, B, TV2-9421A, B, TV2-9422A, TV2-9423A, TV2-9424A, TV2-9425A

FOLDER 2



CHASSIS BOTTOM VIEW-CAPACITOR AND ALIGNMENT IDENTIFICATION

CORONADO MODELS TV2-9414A, B, TV2-9415A, B, TV2-9416A, B, TV2-9417A, B, TV2-9418A, B, TV2-9419A, B, TV2-9420A, B, TV2-9421A, B, TV2-9422A, TV2-9423A, TV2-9424A, TV2-9425A

FOLDER 2

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DENVER, COLORADO

ALTERNATE TUNER SCHEMATIC

CORONADO MODELS TV2-9414A, B, TV2-9415A, B, TV2-9416A, B, TV2-9417A, B, TV2-9418A, B, TV2-9419A, B, TV2-9420A, B, TV2-9421A, B, TV2-9422A, TV2-9423A, TV2-9424A, TV2-9425A

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ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

USE AN ISOLATION TRANSFORMER TO PROTECT THE TEST EQUIPMENT.
The High Voltage lead should be securely taped and kept away from the chassis.
Allow a 20 minute warm-up period for the receiver and test equipment.

VIDEO IF ALIGNMENT

Connect the negative lead of a 1.5 volts bias supply to point Ⓐ. For steps 3 thru 7 increase bias at point Ⓐ to 4.5 volts.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough sweep generator output to provide usable pattern on scope.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Direct	High side to ungrounded tube shield floating over mixer-oscillator tube (V2). Low side to chassis	44.5MC (10MC Swp)	47.25MC	Any non-interfering channel	Vert. Amp. thru detector (Fig. 1) to pin 5 (plate) of 3CB6 (V3). Low side to chassis.	A1	Adjust to place marker in trap notch as in Fig. 2.
2.	"	"	"	41.25MC 45.75MC	"	"	A2, A3, A4	Adjust for response curve similar to Fig. 2 with markers as indicated. A2 and A3 controls shape of curve top and positions 45.75MC marker. A3 positions 41.25MC marker. Both markers must be correctly positioned before proceeding with alignment.
3.	"	"	"	42.8MC	"	Vert. Amp. thru 47K to point Ⓑ. Low side to chassis.	A5	Adjust sweep output for 2 volts at point Ⓑ. Adjust for maximum amplitude at marker.
4.	"	"	"	41.25MC	"	"	A6	Adjust for MINIMUM amplitude at marker.
5.	"	"	"	45.3MC	"	"	A7	Adjust for maximum amplitude at marker.
6.	"	"	"	44.0MC	"	"	A8	"
7.	"	"	"	41.25MC 42.4MC 42.8MC 44.0MC 44.5MC 45.3MC 45.75MC 47.25MC	"	"		Check for response curve similar to Fig. 3 with markers as indicated. If necessary SLIGHTLY retouch A1,and A4 thru A8 for desired reponse. DO NOT retouch A2 or A3.

SOUND IF ALIGNMENT

Turn the set on and tune in a TV station. Reduce the signal strength at the antenna terminals by using an attenuator or similar device until a "Hiss" is heard in the sound.
Adjust A9, A10, All and buzz control (R8) for maximum undistorted sound and MINIMUM buzz.
If the hiss disappears during alignment, reduce signal strength still further.

4.5MC TRAP ALIGNMENT

Use 0-10 volt scale on VTVM.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
8.	.001MFD	High side to pin 2 (grid) of 12BY7A (V6). Low side to chassis.	4.5MC (Unmod)	Any non-interfering	DC probe to pin 11 (cathode) of picture tube. Common to chassis.	A12	Adjust for MINIMUM deflection.

VHF OSCILLATOR ALIGNMENT

Connect the negative lead of 3 volt bias supply to point Ⓓ. Positive to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the fine tuning control to the center of its range.
Use only enough sweep generator output to provide usable pattern on scope.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
9.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. thru 47K to point Ⓑ. Low side to chassis.	A13	Adjust to place sound marker in trap notch as in Fig. 4. Video marker should fall at 50%.
			207MC (10MC Swp)	205.25MC 209.75MC	12		A14	
			201MC (10MC Swp)	199.25MC 203.75MC	11		A15	
			195MC (10MC Swp)	193.25MC 197.75MC	10		A16	
			189MC (10MC Swp)	187.25MC 191.75MC	9		A17	
			183MC (10MC Swp)	181.25MC 185.75MC	8		A18	
			177MC (10MC Swp)	175.25MC 179.75MC	7		A19	
			85MC (10MC Swp)	83.25MC 87.75MC	8		A20	
			79MC (10MC Swp)	77.25MC 81.75MC	5		A21	
			69MC (10MC Swp)	67.25MC 71.75MC	4		A22	
			63MC (10MC Swp)	61.25MC 65.75MC	3		A23	
			57MC (10MC Swp)	55.25MC 59.75MC	2		A24	

ALIGNMENT INSTRUCTIONS (cont)

VHF RF AND MIXER ALIGNMENT FOR TUNER #25A1148-D

Connect bias as under "VHF Oscillator Alignment".
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough sweep generator output to provide usable pattern on scope.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
10.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	195MC (10MC Swp)	193.25MC 197.75MC	10	Vert. Amp. thru 10K to point Ⓒ. Low side to chassis.	A25, A26	Adjust A25 and A26 for response similar to Fig. 5 with markers on shoulders of curve.
11.	"	"	195MC (10MC Swp)	193.25MC 197.75MC	"	"	A27	Adjust for MINIMUM amplitude.
12.	"	"	213MC (10MC Swp)	211.25MC 215.75MC	13	"		Check for response similar to Fig. 5. If markers fall below 70% on any channel, make compromise adjustment of A25 and A26 with channel switch set to that channel. Check all other channels to see that they have not been seriously affected.
			207MC (10MC Swp)	205.25MC 209.75MC	12			
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
			85MC (10MC Swp)	83.25MC 87.75MC	6			
			79MC (10MC Swp)	77.25MC 81.75MC	5			
			69MC (10MC Swp)	67.25MC 71.75MC	4			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			

VHF RF AND MIXER ALIGNMENT FOR TUNERS #25A1145 AND 25A1143

Connect bias as under "VHF Oscillator Alignment".
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough sweep generator output to provide usable pattern on scope.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
13.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	207MC (10MC Swp)	205.25MC 209.75MC	12	Vert. Amp. thru 10K to point Ⓔ. Low side to chassis.	A28, A29, A30	Adjust for response curve similar to Fig. 5, with markers above 90%.
14.	"	"	213MC (10MC Swp)	211.25MC 215.75MC	13	"		Check for response similar to Fig. 5. If markers fall below 70% on any channel, make compromise adjustments of A28, A29, and A30 with channel switch set to that channel. Check all other channels to see that they have not been seriously affected.
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			195MC (10MC Swp)	193.25MC 197.75MC	10			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
			85MC (10MC Swp)	83.25MC 87.75MC	6			
			79MC (10MC Swp)	77.25MC 81.75MC	5			
			69MC (10MC Swp)	67.25MC 71.75MC	4			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			

UHF TUNER ALIGNMENT

This portion of the receiver has been properly aligned at the factory and is very stable. Alignment of this portion should not be required in the field.

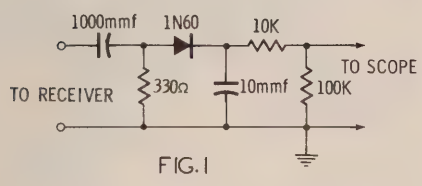


FIG. 1

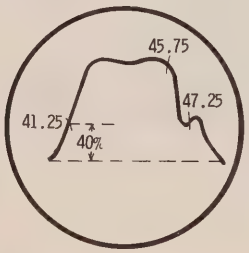


FIG. 2

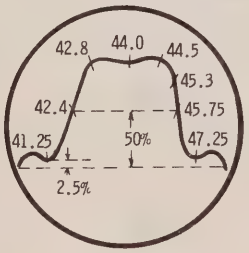


FIG. 3

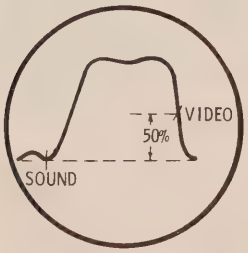


FIG. 4

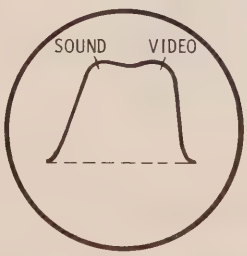
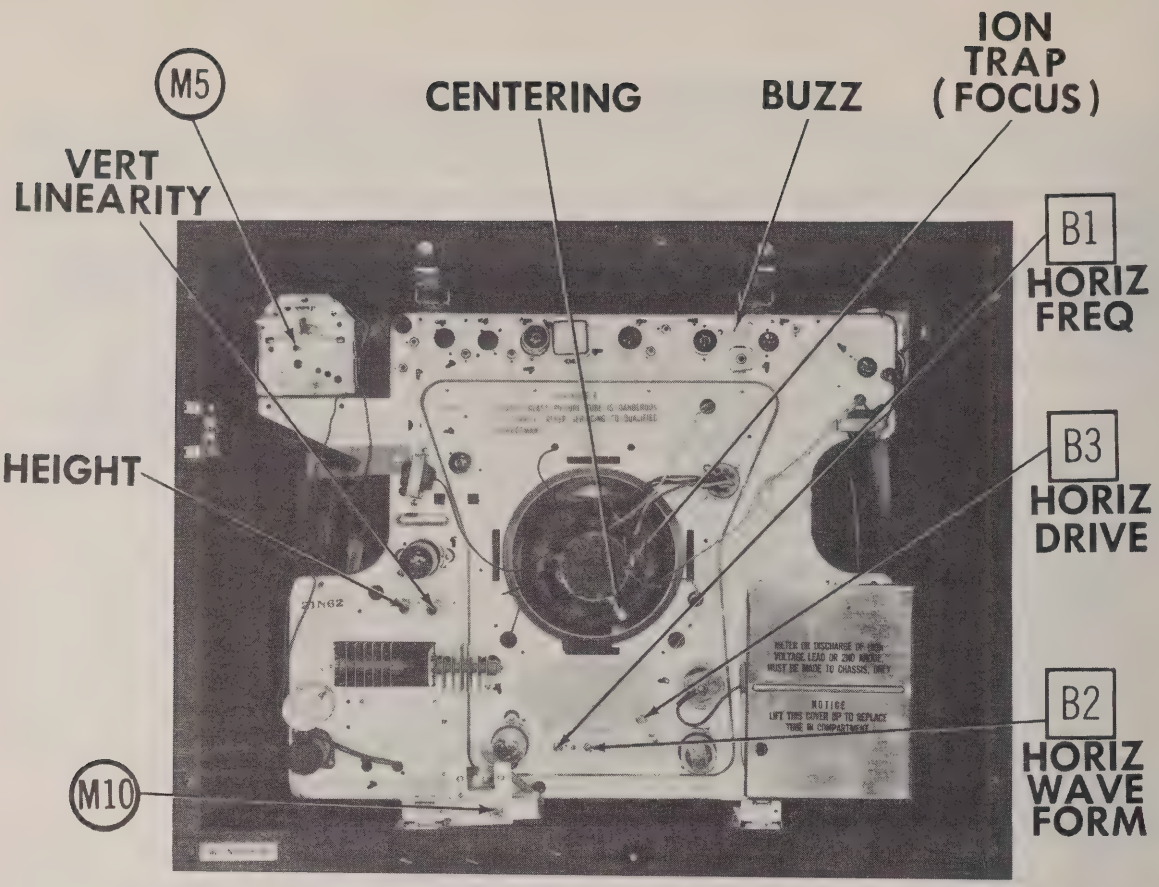


FIG. 5

CORONADO MODELS TV2-9414A, B, TV2-9415A, B, TV2-9416A, B, TV2-9417A, B, TV2-9418A, B, TV2-9419A, B, TV2-9420A, B, TV2-9421A, B, TV2-9422A, TV2-9423A, TV2-9424A, TV2-9425A

FOLDER 2



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably with a test pattern.
Turn the horizontal hold control to the center of its range.
Connect a short clip lead across the horizontal waveform coil (L15).
Adjust the horizontal frequency slug (B1) until the picture synchronizes horizontally.
Remove the clip lead from L15. Connect the vertical amplifier of the scope thru a low capacity probe to point (F). Low side to chassis.

Adjust the horizontal waveform slug (B2) for equal peaks of round and sharp peaks of waveform as in Fig. 6. While making this adjustment, keep the picture in sync with the horizontal hold control and B1.
Adjust the horizontal drive trimmer (B3) clockwise as far as possible without the presence of vertical white lines or compression near the center of the picture.

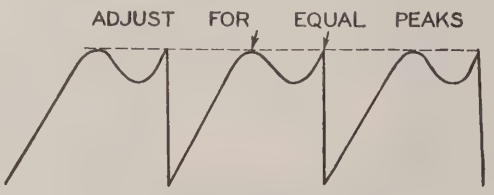
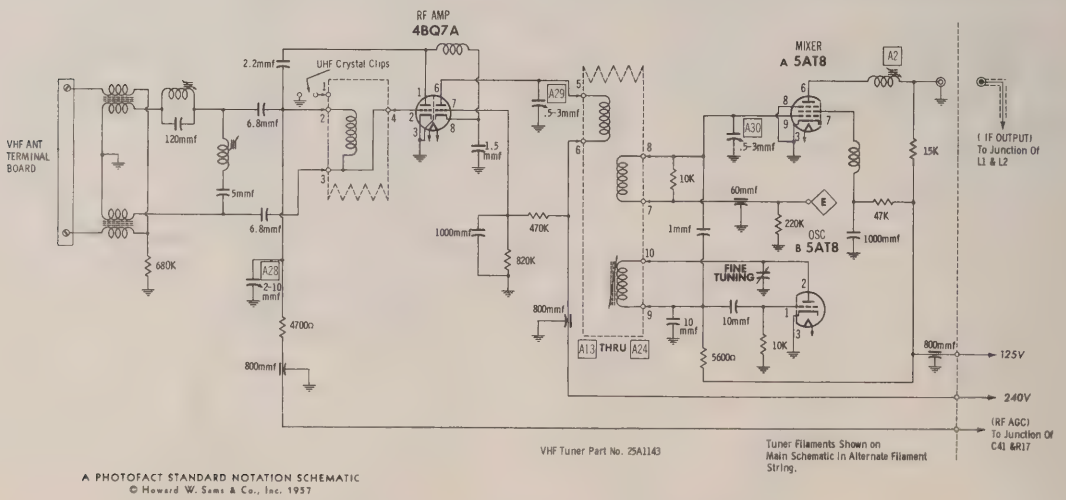


FIG. 6

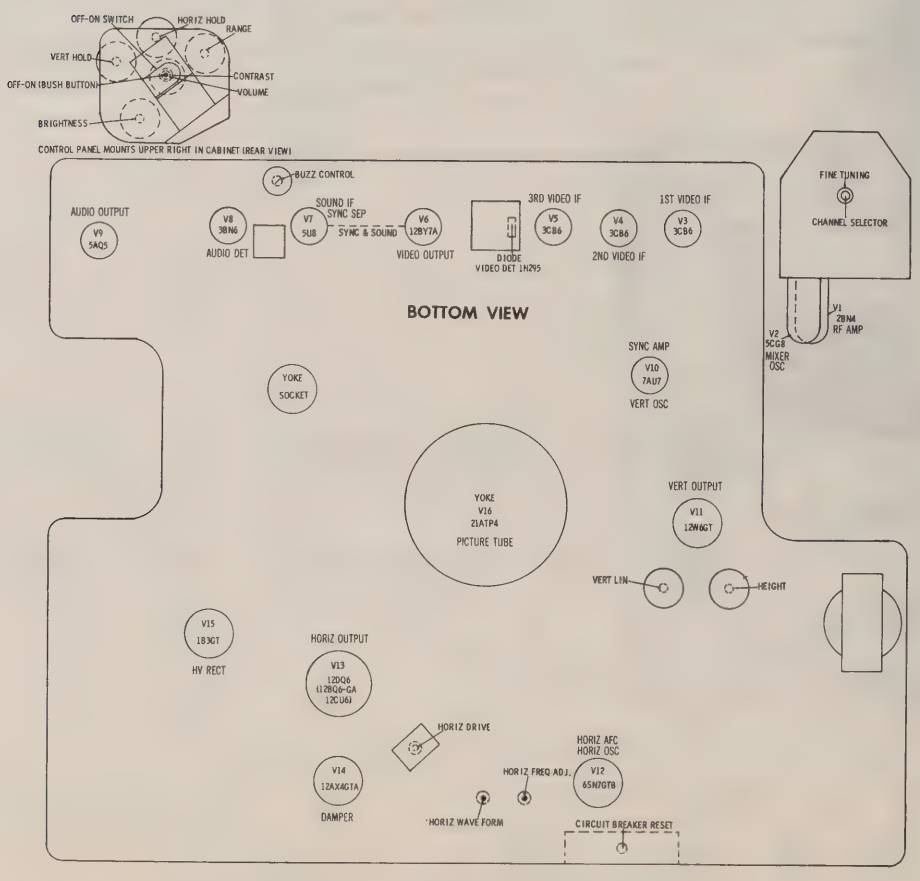


ALTERNATE TUNER SCHEMATIC

RESISTANCE MEASUREMENTS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	2BN4	0Ω	2Meg	1.5Ω	1Ω	† 2700Ω	0Ω	1Meg		
V2	5CG8	10K	† 8500Ω	0Ω	0Ω	1Ω	† 2700Ω	† 12K	0Ω	220K
V3	3CB6	1Meg	47Ω	5Ω	6Ω	† 5500Ω	† 5500Ω	0Ω		
V4	3CB6	1Meg	47Ω	6Ω	7Ω	† 5500Ω	† 5500Ω	0Ω		
V5	3CB6	.1Ω	180Ω	7Ω	8.5Ω	† 2200Ω	† 2200Ω	0Ω		
V6	12BY7A	• 300Ω	1Meg	0Ω	13Ω	13Ω	14Ω	† 3700Ω	† 1700Ω	0Ω
V7	5U8	† 820K	100K	† 150K	8.5Ω	10Ω	† 82K	0Ω	0Ω	2.2Meg
V8	3BN6	• 450Ω	3.4Ω	4.5Ω	5Ω	† 6500Ω	6Ω	† 330K		
V9	5AQ5	55Ω	330Ω	13Ω	10Ω	† 950Ω	† 500Ω	55Ω		
V10	7AU7	‡ • 2.3Meg	• 1.1Meg	22K	14Ω	14Ω	† 13K	38K	0Ω	15Ω
V11	12W6GT	TP	17Ω	† 400Ω	† 400Ω	2.2Meg	TP	15Ω	• 1000Ω	
V12	6SN7GTB	400K	† 56K	0Ω	1.5Meg	• † 55K	400K	3Ω	4.5Ω	
V13	12DQ6	NC	20Ω	TP	† 10K	470K	TP	17Ω	100Ω	TOP CAP ‡ 10Ω
V14	12AX4GTA	TP	NC	¶	NC	† 40Ω	NC	20Ω	22Ω	
V15	1B3GT	PINS	1 THRU 8	HAVE	INFINITE	RESISTANCE				TOP CAP ‡305Ω
V16	21ATP4	1.5Ω	23K	PIN 6 † 100K	PIN 10 ‡470K	PIN 11 170K	PIN 12 3Ω			

† MEASURED FROM OUTPUT OF M 2.
‡ MEASURED FROM PIN 3 OF V14.
• THIS READING WILL VARY, CONTROL SET FOR NORMAL OPERATION.
¶ THIS READING CAN VARY GREATLY, (10K MINIMUM), DUE TO THE CONDITION OF THE ELECTROLYTIC CAPACITOR CONNECTED IN THE ASSOCIATED CIRCUIT.
TP TIE POINT
NC NO CONNECTION



TUBE PLACEMENT CHART

L. F. BLANKENSHIP
3024 MEADE ST.
DENVER, COLORADO

CHASSIS TOP VIEW

HORIZ WAVE FORM 190V

CORONADO MODELS TV2-9414A, B, TV2-9415A, B, TV2-9416A, B, TV2-9417A, B, TV2-9418A, B, TV2-9419A, B, TV2-9420A, B, TV2-9421A, B, TV2-9422A, TV2-9423A, TV2-9424A, TV2-9425A

FOLDER 2

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	RF Amplifier	2BN4	
V2	Mixer-Oscillator	5CG8	
V3	1st Video IF Amp.	5CB6	
V4	2nd Video IF Amp.	5CB6	
V5	3rd Video IF Amp.	5CB6	
V6	Video Output	11BT14	
V7	Sound IF - Sync Sep.	5U8	
V8	Audio Det.	12AV6	

ITEM No.	USE	TYPE	NOTES
V9	Audio Output	5AQ5	
V10	Sync Amp.-Vert.Osc.	7AU7	
V11	Vert Output	12BL6T	
V12	Horiz AFC-Horiz Osc	6SN7GTB	
V13	Horiz Output	12DQ6	Note 1
V14	Damper	12AX4GTA	
V15	HV Rectifier	1B3GT	

Note 1 Some versions may use a 13CU6 or 12BQ6GA in this application

PICTURE TUBE

ITEM No.	REPLACEMENT DATA			NOTES
	CORONADO Part No.	GENERAL ELECTRIC Part No.	SYLVANIA Part No.	
V16	2-ATP4	21ATP4/ 21ATP4A	21ATP4/ 21ATP4A ① 21ATP4A ②	① Aluminized ② Silver screen '65

ELECTROLYTIC CAPACITORS

ITEM No.	RATING			REPLACEMENT DATA						NOTES
	CAP	VOLT		CORONADO Part No.	AEROVOX Part No.	CORNELL-DUBILIER Part No.	MALLORY Part No	PYRAMID Part No	SANGAMO Part No	SPRAGUE Part No.	
C1	160		150	45X241	AFH51-33	XA0251	FP1T	TM5-24	MT-15150	TVL-1428	
C2A	125		300	45X431	AFH4-0260	DO046	FP3T8 CTC36	TM7-25		TVL-3574.6	
B	30		300								
C	30		50								
C3A	35		300	45X430	AFH3-98-82	DO040	FP375.4 CTC80				
B	80		300								
C	40		50								
C4	5		50	45X248	PRS50V5	BBR5-50	TC39	TD-5-50	MT-0504	TVA-1303	

* Non-catalog Item.

FIXED CAPACITORS

Capacity values given in the coronado data are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING			REPLACEMENT DATA							NOTES
	CAP		VOLT	CORONADO Part No.	AEROVOX Part No.	CENTRALAB Part No.	CORNELL-DUBILIER Part No.	ERIE Part No.	MALLORY Part No.	SPRAGUE Part No.	
C5	120				BPD-00012	DD-121	L10T12	ED-120	UC-5315	SGA-T13	
C6	30										
C7	28										
C8	12										
C9	1000			EF-001	MFT-1000					S03C-DI	
C10	4-45				829-8		533-B				N900
C11	10-5										
C12	5				829-8		532-B				
	4-5										
C13	47										
C14	4-5				829-8		533-B				
C15	47										
C16	30										
C17	1000			EF-001	MFT-1000					S03C-DI	
C18	6-8										
C19	6-8										
C20	1000			EF-001	MFT-1000					S03C-DI	
C21	1000			EF-001	MFT-1000					S03C-DI	
C22	1000			EF-001	MFT-1000					S03C-DI	
C23	47			47X503	SI 47	D6-470	L76Q47	ED-47	UC-5447	SGA-Q47	
C24	47			47X503	SI 47	D6-470	L76Q47	ED-47	UC-5447	SGA-Q47	
C25	680			80X5	RCP10M683M	DD-681	L07T68	ED-680	UC-5368	SGA-T68	
C26	56				NPO-SI 56	TC2-56	C10Q56C	TCO-56			NP0
C27	680			80X5	BPD-00068	DD-681	L07T68	ED-680	UC-5368	SGA-T68	
C28	56				NPO-SI 56	TC2-56	C10Q56C	TCO-56		STCC-C68	NP0
C29	680			80X25	BPD-00068	DD-681	L07T68	ED-680	UC-5368	SGA-T68	Note 1
C30	470			80X4	BPD-00047	DD-471	DYA10T47	ED-470	UC-5347	SGA-T47	
C31	680			80X1	BPD-00068	DD-681	L07T68	ED-680	UC-5368	SGA-T68	Note 2
C32	0.047		200	RCP10M3473M	DP8-08	DF-503	CUB3847		GEM-3047	3TM-P47	
C33	30			47X569							N33
C34	1000			80X1	BPD-001	DD-102	BYA5DI	ED-1000	DC52I	S1K-DI	
C35	47			47X563	SI 47	D6-470	L76Q47	ED-47	UC-5447	SGA-Q47	
C36	.1		400	RCP10M4104M	P48N-4	DF-104	CUB42P		GEM-401	4TM-P1	
C37	.047		200	RCP10M3473M	BPD-08	DF-503	CUB2347		GEM-3047	3TM-S47	
C38	.47		200	RCP10M3474M	P38N-47		CUB23P47		GEM-3047	3TM-P47	
C39	1000			80X2	BPD-001	DD-102	BYA5DI	ED-1000	DC52I	S1K-DI	
C40	1000			80X3	BPD-001	DD-102	BYA5DI	ED-1000	DC52I	S1K-DI	
C41	10000			47X396	BPD-01	DD-103	BYA5DI	ED-01	DC51I	S1K-DI	
C42	1.5			47X584	NPO-SI 1.5		TC2-1R5	TCO-1.5	ST-5515	STCC-C1R5	
C43	33			47X591							N470
C44	1000			80X3							N150
C45	1000			80X3	BPD-001	DD-102	BYA5DI	ED-1000	DC52I	S1K-DI	
C46	1000			80X3	BPD-001	DD-102	BYA5DI	ED-1000	DC52I	S1K-DI	
C47A	1000			80X3	BPD-2X003	DD3-102	BYC5DDI	ED5-001	DCD52I	S1K-2DI	
B	1000										
C48	15			47X572							N330
C49	1000			80X1	BPD-001	DD-102	BYA5DI	ED-1000	DC52I	S1K-DI	
C50	5000			47X507	BPD-005	DD-502	BYA1D5	ED-005	DC52I	S5K-D5	
C51	.0047		600	RCP10M4472M	BPD-0047	D6-472	CUB6D47	ED-0047	GEM-6247	6TM-D47	
C52	1000			47X570	464-00033		ABE733			1K-X33	
C53	5000			47X507	BPD-005	DD-502	BYA1D5	ED-005	DC52I	S1K-D5	
C54	.047		400	RCP10M4473M	BPD-05	DF-503	CUB4347		GEM-4147	4TM-S47	
C55	.047		600	RCP10M4703M	BPD-01	DF-503	CUB4347	GP-10000	GEM-401	4TM-S47	
C56	.047		400	RCP10M4473M	BPD-05	DF-503	CUB4347		GEM-4147	4TM-S47	
C57	.022		300	RCP10M2223M	BPD-03	DF-223	CUB3223		GEM-3223	3TM-S22	
C58	.1		400	RCP10M4104M	P48N-4	DF-104	CUB4P1		GEM-401	4TM-P1	
C59	.047		600	RCP10M4703M	BPD-08	DF-503	CUB4347		GEM-6347	6TM-S47	
C60	10			RCM30B100K	464-00015		UR5Q8		MS-418		
C61	82			RCM30B820K	464-00062		UR5Q82		MS-482		
C62	100			RCM30B101K	464-0001		UR5T1		MC35S		
C63	.047		400	RCP10M4473M	BPD-05	DF-503	CUB4347		GEM-4147	4TM-S47	
C64	.047		600	RCP10M4473M	BPD-05	DF-503	CUB4347		GEM-6347	6TM-S47	
C65	.022		300	RCP10M2223M	BPD-03	DF-223	CUB3223	ED-03	GEM-3223	3TM-S22	
C66	.47		200	RCP10M3474M	P38N-47		CUB23P47		GEM-3047	3TM-P47	
C67	15			RCM20B151K	464-00022		UR7Y3			MS-322	
C68	.01		400	RCP10M4103M	BPD-01	DF-103	CUB4S1	ED-01	GEM-401	4TM-S1	
C69	82			RCM20B821K	464-00082		UR7T8			MS-382	
C70	170-210			17A2T							
C71	1000			80X1	BPD-001	DD-102	BYA5DI	ED-1000	DC52I	S5K-DI	
C72	.047		400	RCP10M4473M	BPD-05	DF-503	CUB4347		GEM-4147	4TM-S47	
C73	54		5000	47X755		D6-540	L76Q54	ED-540			
C74	.047		400	RCP10M4473M	BPD-05	DF-503	CUB4347		GEM-4147	4TM-S47	
C75	10000		400	47X583	BPD-01	DD-103	BYA5DI	ED-01	DC51I	S1K-DI	

PARTS LIST AND DESCRIPTIONS

CAPACITORS (cont)

ITEM No.	RATING		CORONADO Part No.	AEROVOX Part No.	CENTRALAB Part No.	CORNELL-DUBILIER Part No.	REPLACEMENT DATA ERIE Part No.	MALLORY Part No	SPRAGUE Part No.	NOTES
C76A	100	600	80X7	BPD-2X001	DD5-101	BYC5DD	ED5-001	DCD52I	S6K-2DI	
B	100	600								

Note 1 Some versions use a 560MMF in this application
Note 2 Some versions use a 1000MMF in this application

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA CORONADO Part No.	CENTRALAB Part No.	CLAROSTAT Part No.	IRC Part No.	MALLORY Part No.	INSTALLATION NOTES
	RESISTANCE	WATTS						
R1A	100Ω	½	78X25					Contrast
B	1MEG	½						Volume
R2A	500K	½	40X416	AB-59	A47-500K-B	QU-133	U50	Brightness
B	Shaft			AE-5	RS-3/16	NQ	D8-37	
R3A	1.5Meg	½	40X415	AB-743	A47-1.5Meg-B	QU-136	U35	Vert. Hold
B	Shaft			AE-5	RS-3/16	NQ	D8-37	
R4A	50K	½	40X414	AB-31	A47-50K-B	QU-133	U35	Horiz. Hold
B	Shaft			AE-5	RS-3/16	NQ	D8-37	
R5	4.5Meg	½	40X417					
R6A	2.5Meg	½	40X398	BX-83	A47-2.5Meg-B	QU-139	TA35AL	Height
B	Shaft			Not Req.	FXR-1/8	TQ	Not Req.	
R7A	1500Ω	½	40X399	B-8	A47-1500-B	QU-109	PTA1521	Vert. Lin.
B	Shaft			Not Req.	FXR-1/8	TQ	Not Req.	
R8	500Ω	3	40X397		39-500		FL-500	Buzz

* The resistance of this control will vary from 7 to 10 megs.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		REPLACEMENT DATA CORONADO Part No.	IRC Part No.	NOTES
	OHMS	WATT			
R9	4700Ω			BTS-4700	
R10	1000Ω			BTS-1000	
R11	3900Ω			BTS-3900	
R12	330K			BTS-220K	
R13	1000Ω			BTS-1000	
R14	5900Ω			BTS-5900	
R15	10K			BTS-10K	
R16	10K			BTS-10K	
R17	2.2Meg		B84335		
R18	5600Ω		B84593		
R19	470Ω		B85471	BTS-470	
R20	5000Ω	4	43X331	WH-4-5000	
R21	470 5%		B82470	BTS-47 5%	
R22	68K		B84683		
R23	1000Ω		B85103		
R24	470Ω		B85471	BTS-470	
R25	470Ω 5%		B85473	BTS-47 5%	
R26	47K		B84473		
R27	22K		B84323	BTS-22K	
R28	470Ω		B85471	BTS-470	
R29	180Ω		B84181	BTS-180	
R30	1Meg		B84105	BTS-1Meg	
R31	3900Ω		B84392	BTS-3900	
R32	1Meg		B84105	BTS-1Meg	
R33	22K		B84223	BTS-22K	
R34	5600Ω	4	43X331	WH-4-5000	
R35	470		B84470	BTS-47	
R36	100K		B85104	BTS-100K	
R37	180K		B84184	BTS-180K	
R38	1.5Meg		B84155	BTS-1.5Meg	
R39	100K		B84104	BTS-100K	
R40	68K		B84683	BTS-68K	
R41	82K		B84823	BTS-82K	
R42	680Ω		B85681	BTS-680	
R43	330K		B84334	BTS-330K	
R44	4700Ω		B85473		
R45	470Ω	1	C85471	BTA-470	
R46	330Ω	1	C84331	BTA-330	
R47	150K		B84154	BTS-150K	

ITEM No.	RATING		REPLACEMENT DATA CORONADO Part No.	IRC Part No.	NOTES
	OHMS	WATT			
R48	2.2Meg		B84225	BTS-2.2Meg	
R49	820K		B84824	BTS-820K	
R50	680K		B84684	BTS-680K	
R51	47K		B84473	BTS-47K	
R52	8200Ω		B85822	BTS-8200	
R53	4700Ω		B84474	BTS-4700	
R54	680K		B84684	BTS-680K	
R55	470K		B84474	BTS-470K	
R56	33K		B84333	BTS-33K	
R57	470K		B84474	BTS-470K	
R58	2.2Meg		B84225	BTS-2.2Meg	
R59	100Ω		B84101	BTS-100	
R60	8200Ω		B84822	BTS-8200	
R61	15K		B84153	BTS-15K	
R62	560Ω	1	C84681	BTA-680	
R63	560Ω				
R64	560K		B84564		
R65	220K		B84224		
R66	330K		B84334		
R67	820K		B84824		
R68	120K		B84124		
R69	47K		B84473	BTS-47K	
R70	82K		B84823		
R71	330K		B84334		
R72	3900Ω		B84392		
R73	82K		B84823		
R74	33K		B84333		
R75	10K		B84103	BTS-10K	
R76	1Meg		B84105	BTS-1Meg	
R77	56K		B84563	BTS-56K	
R78	68Ω		B85680	BTS-68	
R79	470K		B84474	BTS-470K	
R80	10K	2	C84103	BTB-10K	
R81	100Ω	2	C84101	BTB-100	
R82	5600Ω		B84562	BTS-560K	
R83	1700Ω	10	43X336	1 5/A-1750	
R84	25Ω	10	43X290	PW10-25	
R85	260	②	43X339		
R86	6.5Ω	10	43X263		

TRANSFORMER (MISC.)

ITEM No.	RATING				REPLACEMENT DATA CORONADO Part No.	Halldorson Part No.	Merit Part No.	Stancor Part No.	Thordarson Part No.	Triad Part No.
	PRI.	SEC. 1	SEC. 2	SEC. 3						
T1	117VAC	6.3V			54X07 ①	F55U ③①	P-2964 ②	P-8134 ②	21F08 ③①	F-13X ①
	⏚ Dia	⏚ 2A								

① 54X06 alternate part number.
② Drill one new mounting hole.
③ Tape center tap on secondary winding.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	CORONADO Part No.	Halldorson Part No.	Merit Part No.	RCA TYPE No.	Ram Part No.	Stancor Part No.	Thordarson Part No.	Triad Part No.
T3	Vert. Osc.	54X09	B8109	AVO-503	20V71 ①	Y40S	A-8125	28A09	A-97X
T4	Horiz. Output	53X359A	F8469 ① * ‖	HVO-38 ① *‖	25Y71 ① * ‖	2094 ① *‖	RO-383 *	FLY-16 ① *‖	D-50 ① * ‖
	Alt. Horiz. Output	53X359							
T4	Vert. Output	51X173A	21900 ② ‖	A-2833 ② ‖	V30Z1 ② ‖	A-8146 ②	26875 ②	A-116X ②	
	Alt. Vert. Output	51X173	21900 ② ‖	A-2833 ② ‖	V30Z1 ② ‖	A-8146 ②	26875 ②	A-116X ②	
T5A	Yoke-Horiz. (24MH)	54X267-1B	DF907 ③‖	MDF-92 ③ ‖	25Z6 ③‖	Y60P19/45 ③‖	DY-16A ③	Y-16 ③‖	Y-41 & NW1 ③
B	(90°) Vert. (39MH)						DY-16A ③	Y-16 ③‖	Y-41 & NW1 ③
	Alt. Yoke	54X287	DF907 ③‖	MDF-92 ③ ‖	25Z6 ③‖	Y60P19/45 ③‖			
M8	Yoke Rear Cover & Centering Device	54X426							YC1 CL1
	Yoke Clamp	30X611							

① Drill new mounting hole(s).
② Use 8 to 1 turns ratio.
③ Connect as auto transformer.
④ Cut and tape green lead.
⑤ Mount with leads out top and connect same as original using original horizontal damping network.
⑥ Use original rear cover and centering device.
‖ This part may be superceded by Parts Manufacturer's introduction of special unit for this application.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

	ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
	8	9	9	0	9	8	9	9
	3	7 or 5	7 or 5	7 or 8	7 or 8	3	7 or 5	7 or 5
	2	See Note ⑦ NC	See Note ⑦ NC	See Note ⑦ NC	See Note ⑦ NC	2	See Note ⑦ NC	See Note ⑦ NC
	1	1	1	1	1	1	1	1
Special Note		7	7	7	7		7	7

⑦ Install new damping network, consisting of approx. 100MMF ② 2KV and 1000Ω ④ ½ watt, across horizontal yoke terminals #3 and #7.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA CORONADO Part No.	Halldorson Part No.	Merit Part No.	Stancor Part No.	Thordarson Part No.	Triad Part No.	NOTES
	PRI.	SEC.							
T8	8200Ω	8-8Ω	51X180	21000 ①	A-1900 ①	A-3337	34B80 ①	S-5LX ①	① Drill one new mounting hole. Tape center tap on primary winding.

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA CORONADO Part No.	GUAM Part No.	NOTES
	SIZE	FIELD	V. C. IMP			
SP1	6"	PM	8-8Ω	12A838	6A1527	① Alternate part number
	5"	PM	8-8Ω	12A540 ①	5A8TR28.4	
	8"	PM	8-8Ω	12A839 ①	8A628	

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA CORONADO Part No.	MEISSNER Part No.	MERIT Part No.	MILLER Part No.	NOTES
L2	IF Coupling Coil	9A3269			6235	
L3	1st. Video IF	9A3265		TV-131	6235	
L4	2nd. Video IF	9A3263			6232	Includes 47.25MC trap and Cap.
	3rd. Video IF	9A3264			6231	Includes 41.25MC trap, cap. and resistor.
L5	Tweet Choke	9A3275				30 Microhenries
L6	Shunt Peaking Coil	38A13	19-3160 *	TV-184 *	6180 *	160 Microhenries, wound on 22K resistor
L7	4.5MC Trap	9A3286	30-1004	TV-151	1469	
L8	Series Peaking Coil	38A38		TV-190 ▲	6132 ▲	350 Microhenries, wound on 6800Ω resistor
L9	Shunt Peaking Coil	38A33	19-3260 *	TV-185 *	6181 *	225 Microhenries, wound on 2200Ω resistor
L10	1st. Sound IF	9A3286	30-1004	TV-151	1469	
L11	2nd. Sound IF	9A3266	17-3496	TV-113	6203	Includes 22MMF Cap.
L12	Quadrature Coil	9A3267	30-1005	TV-121	1480	
L13	RF Choke	9A3280	19-1001		4604	1.5 Microhenries

* Parallel with 22K resistor.
▲ Parallel with 6800Ω resistor.
▲ Parallel with 2200Ω resistor.

TRANSFORMER (HORIZ. OSC.)

ITEM No.	DC RES.		REPLACEMENT DATA CORONADO Part No.	MEISSNER Part No.	MERIT Part No.	MILLER Part No.	RCA TYPE No	Ram Part No	Thordarson Part No.	NOTES
	PRI.	SEC.								
L14	75Ω		9A3271			HS-7 *				Tapped ② 350, 12.4 to 48.5 Millinseries Horiz. Freq. 7.5 to 30 Millisecures Horiz. Waveform
L15	60Ω		9A3273							

* Enlarge mounting hole.

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA CORONADO Part No.	Halldorson Part No	Merit Part No	Stancor Part No	Thordarson Part No	Triad Part No.
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE @ CURRENT 1000 ᶜ/ₛ)						
L16	.250A	40Ω	.7 HY.	53X98-3	C9037 ①	C-3296 ①	C-3236 ①	26C44 ①	C-21X

① Drill one new mounting hole.

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	CORONADO Part No.	REPLACEMENT DATA
K1	Ant. Input	470MMF, .3-1Meg	76X31	Centralab RC-47I
K2	Ant. Input	470MMF, .3-1Meg	76X31	Centralab RC-47I
K3	Chassis Isolation	470MMF, .3-1Meg	76X31	Centralab RC-47I
K4	Vert. Integrator	2000MMF, 5000MMF, 5000MMF, 22K, 820Ω, 820Ω	76X7	Aerovox P.A.I.O Centralab PA.U.O Cornell Dubilier 1403-1 Erie Y-1 Sprague

RECTIFIERS

ITEM No.	RATING		REPLACEMENT DATA CORONADO Part No.	FEDERAL	INTERNATIONAL	SARKES TARZIAN Part No.	NOTES
	CURRENT (Measured)						
M1	.265A	85X16 ①	1090A ①	1N1007 ②	RS3006L ①	100 ①	① Selenium Type.
M2	.265A	85X16 ①	1090A ①	1N1007 ②	RS3006L ①	500 ①	② Germanium Type.

PARTS LIST AND DESCRIPTIONS (Continued)

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA			NOTES
		CORONADO PART No.	CBS PART No.	SYLVANIA PART No.	
M3	1N295 *		1N60	1N60	Video Det. (Pigtail)

* A CK706 or 1N60 may be used in this application.

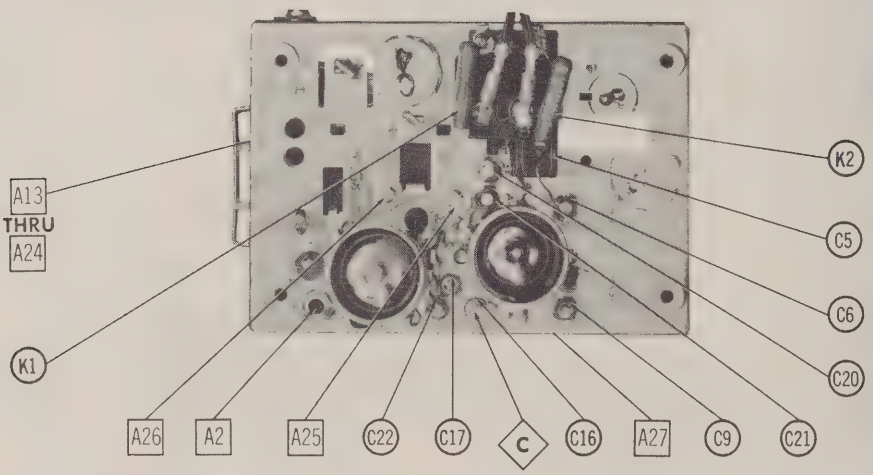
MISCELLANEOUS

ITEM No.	PART NAME	CORONADO PART No.	NOTES
M4	Dial Light		#51 Type (A type #15 may be used in some versions)
M5	Tuner	25A1148-D	VHF
	Tuner	25A1145	UHF-VHF
	Tuner	25A1143	VHF
M6	Video Det. Assy.	9A2370	Includes 4th. Video IF, peaking coil, caps., M3
M7	Switch	2A464	On-off (Push type)
M8	Centering Device	2A435	Includes rear yoke cover
M9	Ion Trap	2A421	
M10	Circuit Breaker	2A461	

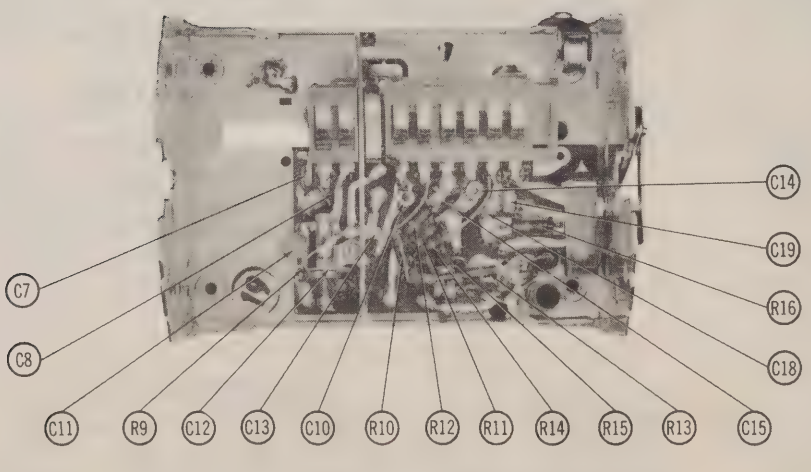
CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

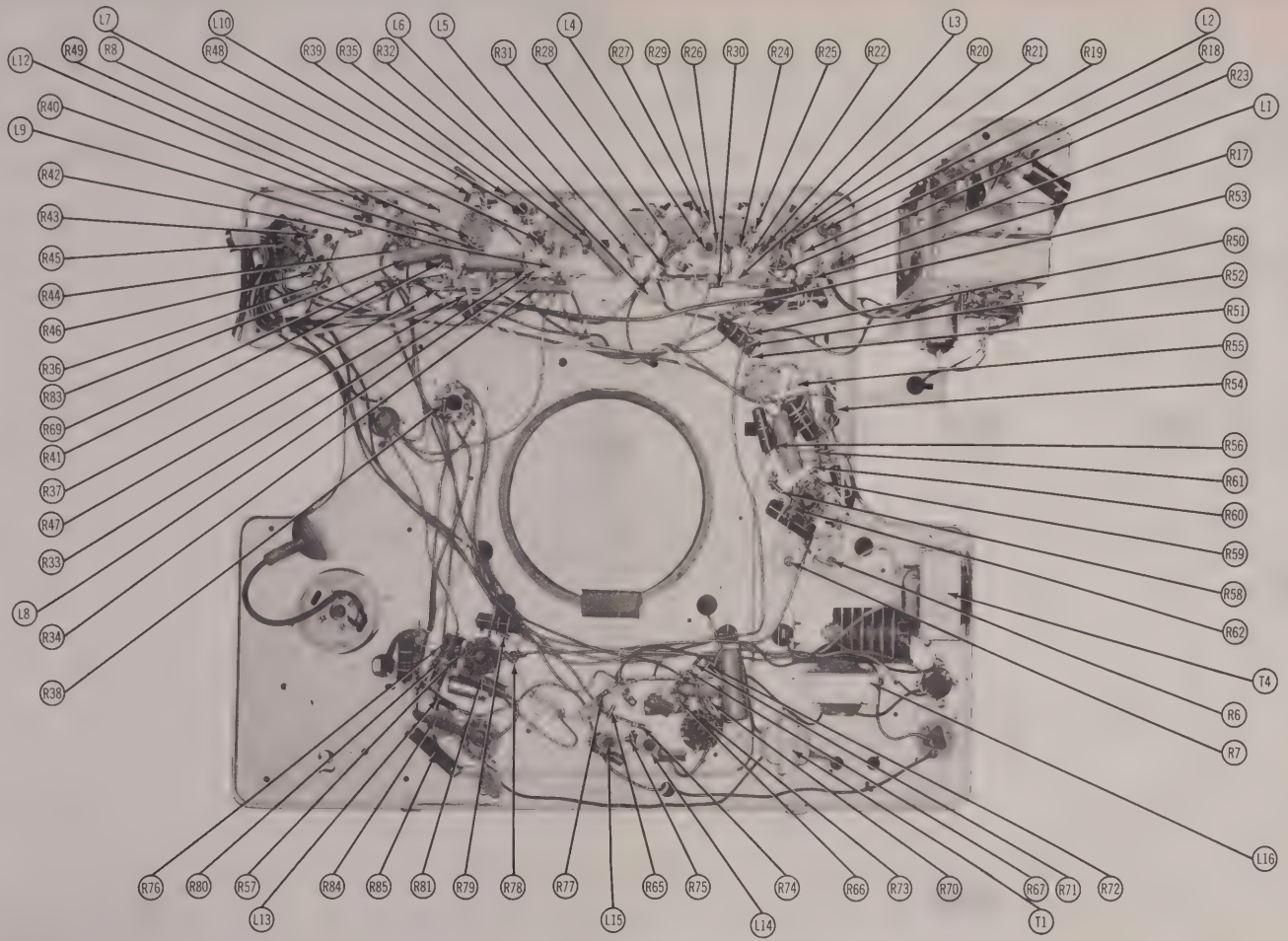
NAME	PART NO.	DESCRIPTION
Safety Glass	17X193-1	Tinted - Models TV2-9414A, 14B, 15A, 15B, 16A, 16B, 17B, 18A, 18B, 19A, 19B, 20A, 20B, 21A, 21B
Safety Glass	17X192	Models TV2-9422A, 23A, 24A, 25A
Mask	4X1287-1	Models TV2-9422A, 23A, 24A, 25A
Mask	S-38A220	Models TV2-9414A, 14B, 15A, 15B, 16A, 16B, 17A, 17B, 18A, 18B, 19A, 19B, 20A, 20B, 21A, 21B
Leg	81X7-3	Mahogany
Leg	81X7-4	Blonde



RF TUNER TOP VIEW



RF TUNER BOTTOM VIEW



CHASSIS BOTTOM VIEW-RESISTOR AND INDUCTOR IDENTIFICATION

PHOTOFACT* Folder

*TRADE MARK

SYLVANIA MODELS 17P101, J, 17P102, 17P103, 17P201 (Ch. 1-537-1, -3, -4)

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

MODEL 17P101J (CH. 1-537-1

SYLVANIA MODELS 17P101, J, 17P102, 17P103, 17P201
(Ch. 1-537-1, -3, -4)

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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FOLDER 3

PHOTOFACT* Folder

*TRADE MARK

RETMA MEMBER

SYLVANIA MODELS 17P101, J, 17P102, 17P103, 17P201 (Ch. 1-537-1, -3, -4)

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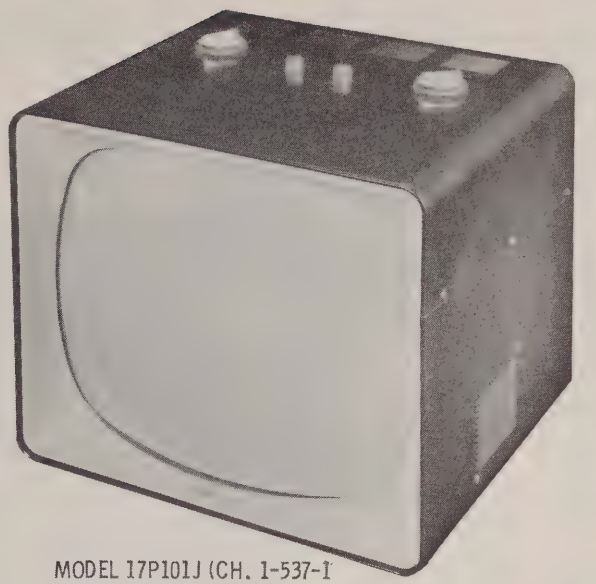
DENVER, COLORADO

DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

1. Remove 7 metal screws, 1 hex nut and the rear cover.
2. Rotate channel selector to channel 7, adjust fine tuning knob to expose spring lock of channel selector knob inside rear of cabinet. Depress spring lock with screwdriver and remove channel selector knob. Remove fine tuning knob, disengage 3 remaining knobs from control shafts.
3. Remove 2 chassis bolts from rear of cabinet.
4. Remove picture tube socket, ion trap, yoke clamp, yoke and HV lead.
5. Remove 2 metal screws and speaker.
6. Lift chassis to disengage plastic feet and remove chassis.
7. Remove 6 metal screws and cabinet top.
8. Remove 2 metal screws holding picture tube bracket.
9. Remove picture tube.



MODEL 17P101J (CH. 1-537-1

CAUTION NOTE

ONE SIDE OF AC LINE CONNECTED TO CHASSIS
Care should be exercised when connecting test equipment or physically contacting the chassis.

TRADE NAME	Sylvania Models 17P101, J, 17P102, 17P103, 17P201 (Ch. 1-537-1, -3, -4)
MANUFACTURER	Sylvania Electric Products, Inc., Radio & Television Div., 700 Ellicott St., Batavia, N.Y.
TYPE SET	Television Receiver
TUBES	Sixteen
POWER SUPPLY	110-120 Volts AC, 60 Cycle RATING 165 Watts, 1.5 Amp. @ 117 Volts AC
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

For touch-up adjustment of the VHF oscillator it is necessary to remove the chassis from the cabinet.(See disassembly instructions).

PICTURE TUBE SAFETY GLASS CLEANING

For picture tube and safety glass cleaning, it is necessary to remove the chassis. (See disassembly instructions).

SPECIAL ADJUSTMENTS

A. AGC
Observe the picture and advance the AGC control to a point where the picture distorts or a buzz is heard in the sound. Back off from this setting until the picture becomes stable with no noise in the sound.

B. Focus
Adjust the ion trap for the best focus consistent with maximum brightness.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

The horizontal frequency coil is used as the horizontal hold control. Adjust the horizontal hold until the picture synchronizes horizontally. (For location, see tube placement chart).

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the ratio detector secondary (A8) located on top of chassis.

FUSE DEVICE

A 4.7Ω fusible resistor (R84) is used for LV power supply protection. (For location, see tube placement chart).

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the tube until the picture is properly centered.

ANTI-PIN CUSHION CORRECTION

Reduce the picture size so that the sides of the raster are visible. Position the 2 magnets so that all sides are straight.

SYLVANIA MODELS 17P101, J, 17P102, 17P103, 17P201 (Ch. 1-537-1, -3, -4)

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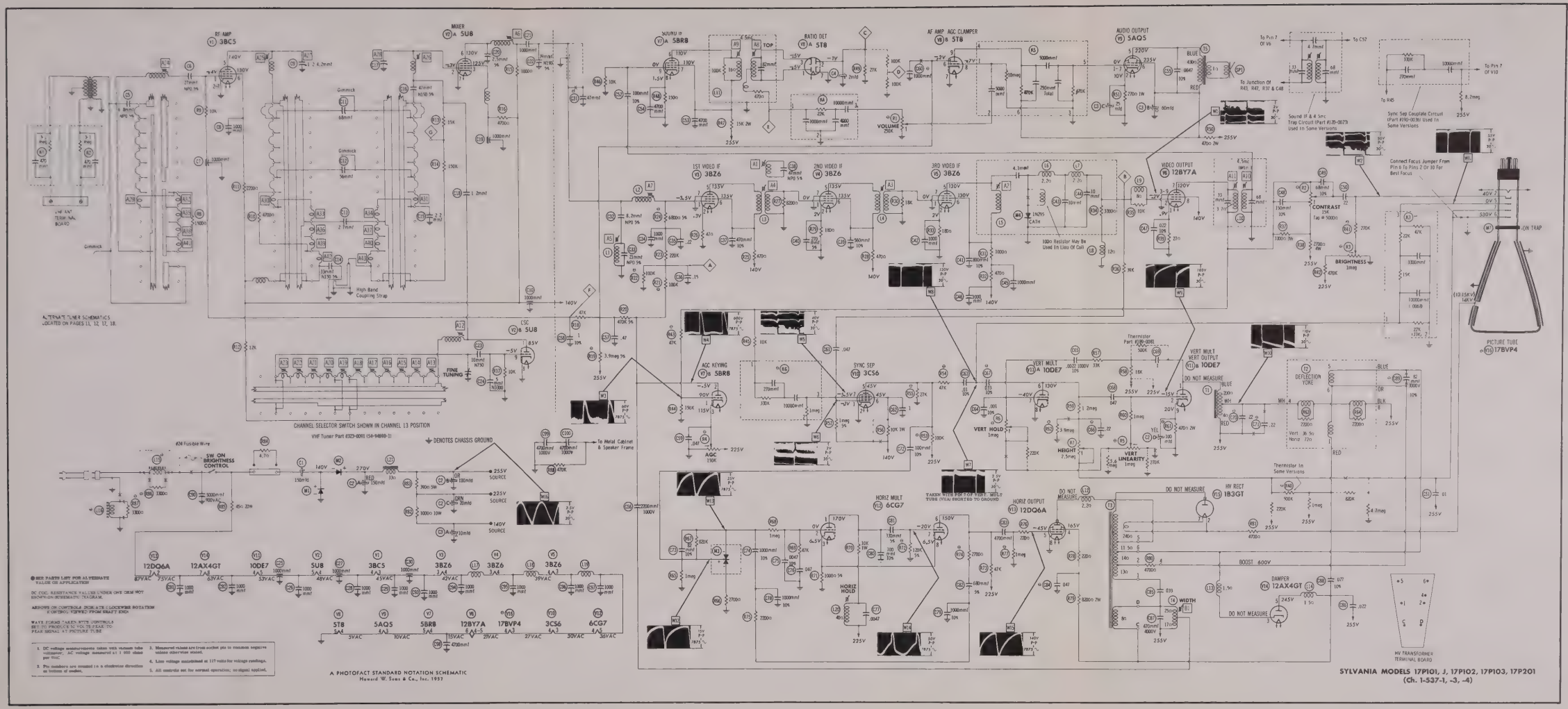
H129

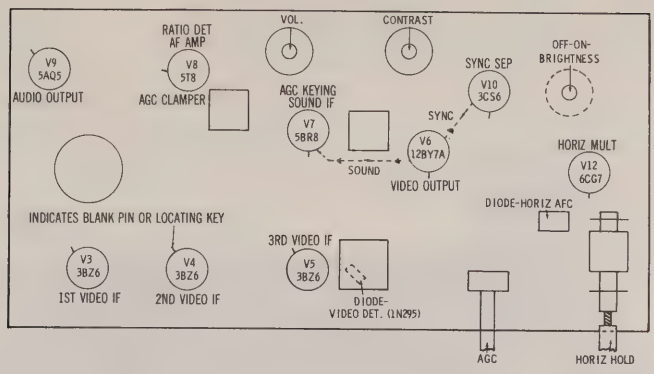
FOLDER 3


RF AMP V1 3BC5
MIXER V2 A 5U8
OSC V2 B 5U8
1ST VIDEO IF V3 3BZ6
2ND VIDEO IF V4 3BZ6
3RD VIDEO IF V5 3BZ6
RATIO DET V6 A 5T8
AF AMP AGC CLAMPER V6 B 5T8
AUDIO OUTPUT V9 5AQ5
VIDEO OUTPUT V6 12BY7A
PICTURE TUBE V16 17BVP4
VHF TUNING BOARD
CHANNEL SELECTOR SWITCH SHOWN IN CHANNEL 13 POSITION
VHF Tuner Part #323-0091 (56-94869-1)
FINE TUNING
VOLUME 250K
CONTRAST 25K Tap @ 5000Ω
BRIGHTNESS 1meg
SYNC SEP V10 3CS6
AGC KEYING V7 B 5BR8
AGC 150K
VERT MULT V11 A 10DE7
VERT HOLD 1meg
HEIGHT 2.5meg
VERT LINEARITY 1meg
VERT MULT VERT OUTPUT V11 B 10DE7
DEFLECTION YOKE
HORIZ MULT 6CG7
HORIZ HOLD
HORIZ OUTPUT V13 12DQ6A
HV RECT 1B3GT
DAMPER 12AX4GT
WIDTH
BOOST 600V
DO NOT MEASURE
SW ON BRIGHTNESS CONTROL
#24 Fusible Wire
DENOTES CHASSIS GROUND
To Metal Cabinet & Speaker Frame
255V SOURCE
225V SOURCE
140V SOURCE
Thermistor Part #190-0081
Thermistor In Some Versions
To Junction Of R43, R47, R39 & C48
To Pin 7 Of V6
To C52
To R45
To Pin 7 Of V10
Sound IF & 4.5mc Trap Circuit (Part #190-0030) Used In Some Versions
Sync Sep Coupler Circuit (Part #190-0029) Used In Some Versions
Connect Focus Jumper From Pin 6 To Pins 2 Or 10 For Best Focus
ION TRAP
HV TRANSFORMER TERMINAL BOARD
TAKEN WITH PIN 7 OF VERT. MULT TUBE (V11A) GROUNDED TO GROUND
1ST VIDEO IF GRID
2ND VIDEO IF GRID
3RD VIDEO IF GRID
VIDEO DET
VIDEO OUT
SYNC SEP
VERT OUT
HORIZ OUT
HV
12DQ6A 12AX4GT 10DE7 5U8 3BC5 3BZ6 3BZ6 3BZ6
5T8 5AQ5 5BR8 12BY7A 17BVP4 3CS6 6CG7
SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION
DC COG: RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM.
ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION FOR CW SHAFT END
WAVE FORMS TAKEN WITH CONTROLS SET TO PRODUCE 10 VOLTS PEAK TO PEAK SIGNAL AT PICTURE TUBE
1. DC voltage measurements taken with vacuum tube voltmeter. AC voltage measured at 1 000 ohms per VAC.
2. Pin numbers are counted in a clockwise direction as bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line voltage maintained at 117 volts for voltage readings.
5. All controls set for normal operation; no signal applied.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
Howard W. Sams & Co., Inc. 1957

SYLVANIA MODELS 17P101, J, 17P102, 17P103, 17P201 (Ch. 1-537-1, -3, -4)

TUBE PLACEMENT CHART



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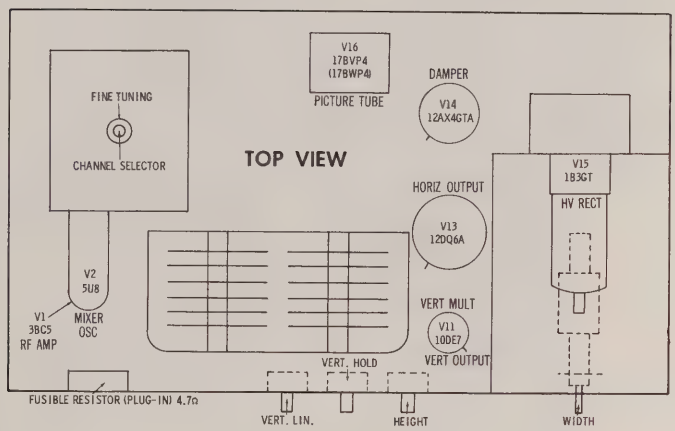
3924 MEADE ST.
DENVER, COLORADO



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

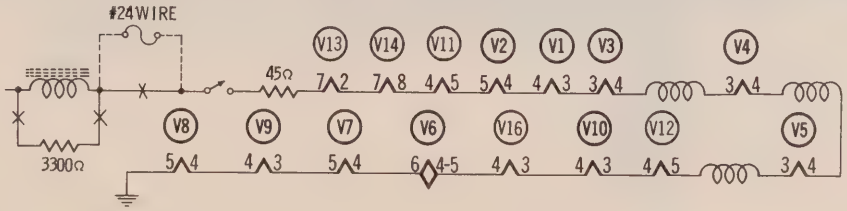
POWER SUPPLY FAILURE
No raster, no sound - **Fusible Resistor (R84), Rectifier (M1, M2)**
(#24 wire some versions)

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - **V3, V4, V5, Diode (M4), V6**
No pic, no sound, has snow - **V1, V2, V3**
No pic, has sound, has raster - **V6, V16**
Has pic, no sound - **V7, V8, V9**
Overloaded picture - **V7, V8**

SYNC FAILURE
No vert. sync - **V10**
No horiz. sync - **V10, Diode (M3)**
No vert. or horiz. sync - **V10**

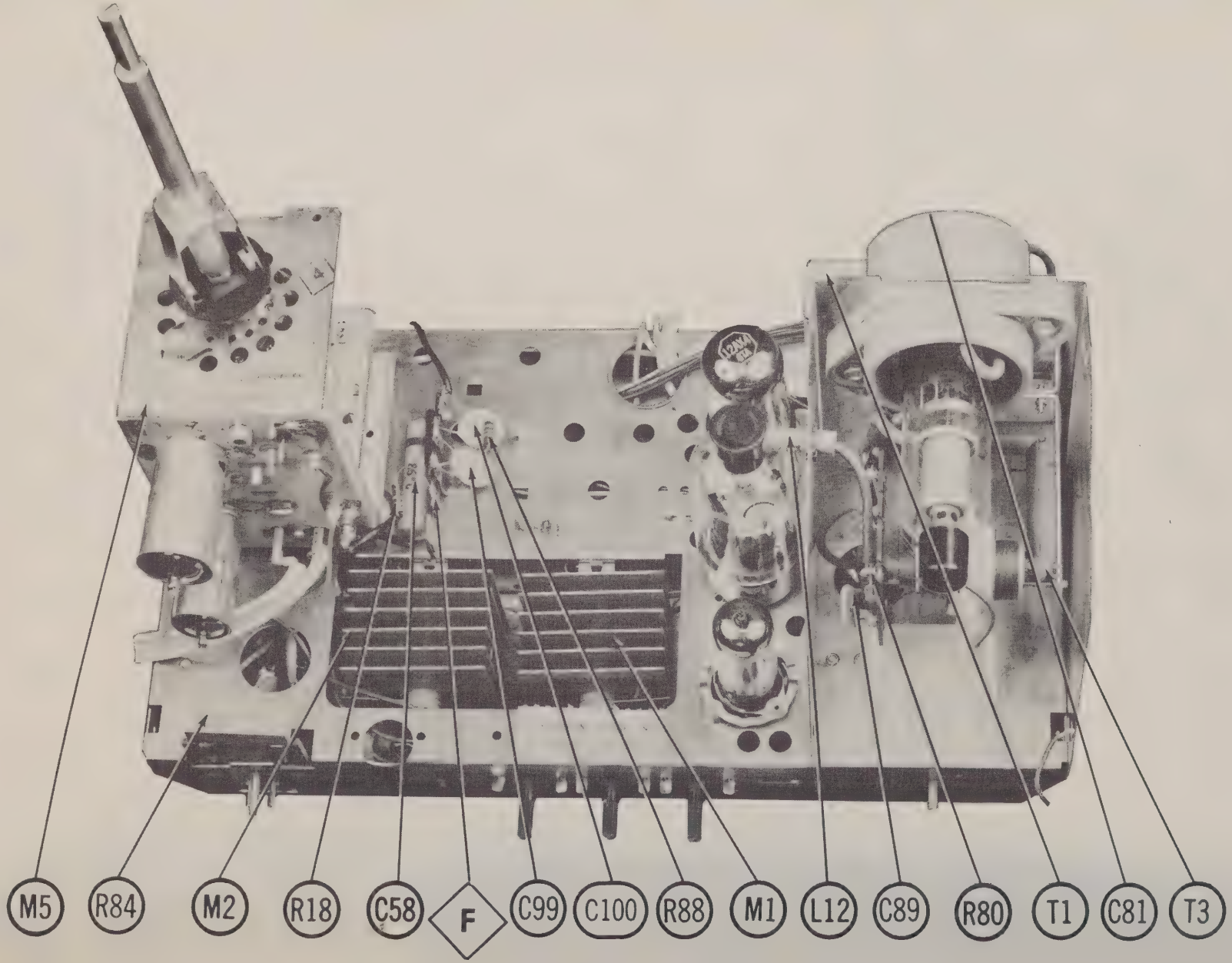
SWEEP FAILURE
No raster, has sound - **M3, V12, V13, V14, V15, V16**
No vertical deflection - **V11**
Poor vert. linearity or foldover - **V11**
Poor horiz. linearity or foldover - **V12, V13, V14**
Narrow picture - **V12, V13, V14, M1, M2**
Vert. off freq. - **V11**
Horiz. off freq. - **V12**

This receiver employs tubes used in a series filament network, an open filament in any tube in the series will cause the set to be inoperative. (See circuit below).



SYLVANIA MODELS 17P101, J, 17P102, 17P103, 17P201
(Ch. 1-537-1, -3, -4)

FOLDER 3



CHASSIS TOP VIEW

CHASSIS TOP VIEW—CAPACITOR IDENTIFICATION

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

ALIGNMENT INSTRUCTIONS

PRE-ALIGNMENT INSTRUCTIONS

USE AN ISOLATION TRANSFORMER TO PROTECT THE TEST EQUIPMENT.
The high voltage lead should be securely taped and kept away from the chassis.

VIDEO IF ALIGNMENT

Connect the negative lead of a 9 volt bias supply to point (A) . Positive to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough sweep generator output to provide a usable pattern on scope.
Use 10MC sweep unless otherwise noted.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	.0047 MFD	High side to pin 1 (grid) of the 3BZ6 (V3). Low side to chassis.	43.5MC	41.25MC	Any non-interfering channel	Vert. Amp. thru 33K to point (B) . Low side to chassis.	A1	Adjust sweep generator to provide 3 volts peak to peak on scope. Adjust A1 to place 41.25MC in trap notch. (See Fig. 1).
2.	"	"	"	44.0MC	"	"	A2	Adjust for maximum response at the marker.
3.	"	"	"	45.3MC	"	"	A3	"
4.	"	"	"	42.7MC	"	"	A4	"
5.	"	"	"	41.25MC 42.6MC 45.75MC	"	"		Check for response similar to Fig. 1 with markers as shown. If necessary, retouch A2 thru A4 for desired response. A2 will remove the tilt, A3 to position the 45.75MC marker and A4 to position the 42.6MC marker.
6.	"	"	"	47.25MC	"	"	A5	Adjust for MINIMUM response at 47.25MC marker. Repeat steps 1 thru 6.
7.	Direct	Place thin insulated metal strip between the mixer-osc. tube (V2), and tube shield. Connect the high side of sweep generator to the metal strip. Low side to chassis.	"	41.25MC 42.6MC 45.75MC 47.25MC	"	"	A6, A7	Adjust for maximum gain and symmetry of response similar to Fig. 2 with markers as shown.

SOUND IF ALIGNMENT

Connect the negative lead of 45 volt bias supply to point (A) . Positive to chassis.
Set the contrast control fully clockwise and the brightness control fully counter clockwise.
Connect a series tuned 4.5MC circuit between pin 2 (cathode) of picture tube and chassis.
Connect two matched 100K (±1%) resistors in series from point (C) to chassis. The junction of these two resistors is alignment point (D) as shown on the schematic.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
8.	.001MFD	High side to point (B) . Low side to chassis.	4.5MC (Unmod)	Any non-interfering channel	DC probe thru 100K to point (E) . Common to point (D) .	A8, A9, A10, A11	Adjust for maximum deflection. Use peaks resulting in greatest separation of cores.
9.	"	"	"	"	Thru RF probe across coil of series tuned 4.5MC circuit.	A11	Adjust for MINIMUM deflection.
10.	"	"	"	"	DC probe thru 100K to point (E) Common to point (D) .	A8	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

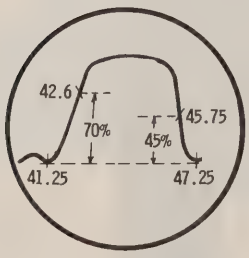


FIG. 1

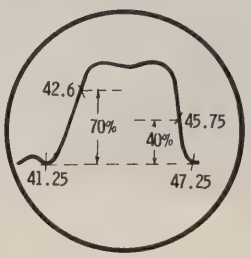


FIG. 2

ALIGNMENT INSTRUCTIONS (cont)

VHF OSCILLATOR ALIGNMENT

Connect the negative lead of a 3.5 volt supply to point Ⓐ. Positive to chassis.
Keep all exposed "Hot" leads of sweep generator and marker generator as short as possible.
Connect a clip lead from pin 5 (grid)of the 12DQ6A (V13) to pin 2 (grid) of the 10DE7 (V11). Connect the negative lead of a 25 volt bias supply to one of these two grids. Connect the positive lead to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the fine tuning to the center of its range.
Use only enough sweep generator output to provide a usable pattern on scope.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
11.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. thru 47K to point Ⓑ. Low side to chassis.	A12	Adjust to place sound marker in trap notch as in Fig. 3. Video marker should fall at 50%. Some tuners do not have adjustments for each channel. Adjust the slugs that are provided.
			207MC (10MC Swp)	205.25MC 209.75MC	12		A13	
			201MC (10MC Swp)	199.25MC 203.75MC	11		A14	
			195MC (10MC Swp)	193.25MC 197.75MC	10		A15	
			189MC (10MC Swp)	187.25MC 191.75MC	9		A16	
			183MC (10MC Swp)	181.25MC 185.75MC	8		A17	
			177MC (10MC Swp)	175.25MC 179.75MC	7		A18	
			85MC (10MC Swp)	83.25MC 87.75MC	6		A19	
			79MC (10MC Swp)	77.25MC 81.75MC	5		A20	
			69MC (10MC Swp)	67.25MC 71.75MC	4		A21	
			63MC (10MC Swp)	61.25MC 65.75MC	3		A22	
			57MC (10MC Swp)	55.25MC 59.75MC	2		A23	

VHF RF AND MIXER ALIGNMENT

Leave the 25 volt bias supply connected as under "VHF Oscillator Alignment".
Connect the negative lead of 3.5 volt bias supply to point Ⓕ. Positive to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough sweep generator output to provide a usable pattern on scope.
Coils not containing adjustable cores are adjusted by expanding or compressing coil turns.
Use 10MC sweep unless otherwise noted.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
12.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	213MC	211.25MC 215.75MC	13	Vert. Amp. thru 33K to point Ⓖ. Low side to chassis.	A24, A25, A26	Adjust A24 for maximum response amplitude. Adjust A25 and A26 for symmetrical double peaked response similar to Fig. 4.
13.	"	"	177MC	175.25MC 179.75MC	7	"	A27, A28	Adjust for maximum gain and symmetry of response similar to Fig. 4 with markers as shown. Repeat step 12.
14.	"	"	207MC	205.25MC 209.75MC	12	"		Check for response similar to Fig. 4. If markers fall below 70% on any channel, make compromise adjustments of A24 and A28 with channel switch set to that channel. Check all other high band channels to see that they have not been seriously affected.
			201MC	199.25MC 203.75MC	11			
			195MC	193.25MC 197.75MC	10			
			189MC	187.25MC 191.75MC	9			
			183MC	181.25MC 185.75MC	8			
15.	"	"	85MC	83.25MC 87.75MC	6	"	*A29, A30, A31	Adjust coils whose "A" number is preceded by (*), for maximum amplitude of response curve. Adjust others for symmetrical response similar to Fig. 4. Some tuners may have fixed coils for channels 5 thru 2. In such cases, make compromise adjustments of A29, A30 and A31.
			79MC	77.25MC 81.75MC	5		*A32, A33, A34	
			69MC	67.25MC 71.75MC	4		*A35, A36, A37	
			63MC	61.25MC 65.75MC	3		*A38, A39, A40	
			57MC	55.25MC 59.75MC	2		*A41, A42, A43	

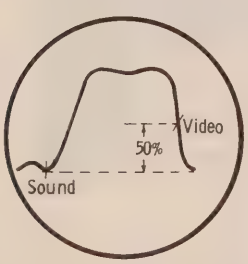


FIG. 3

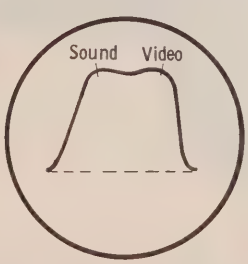
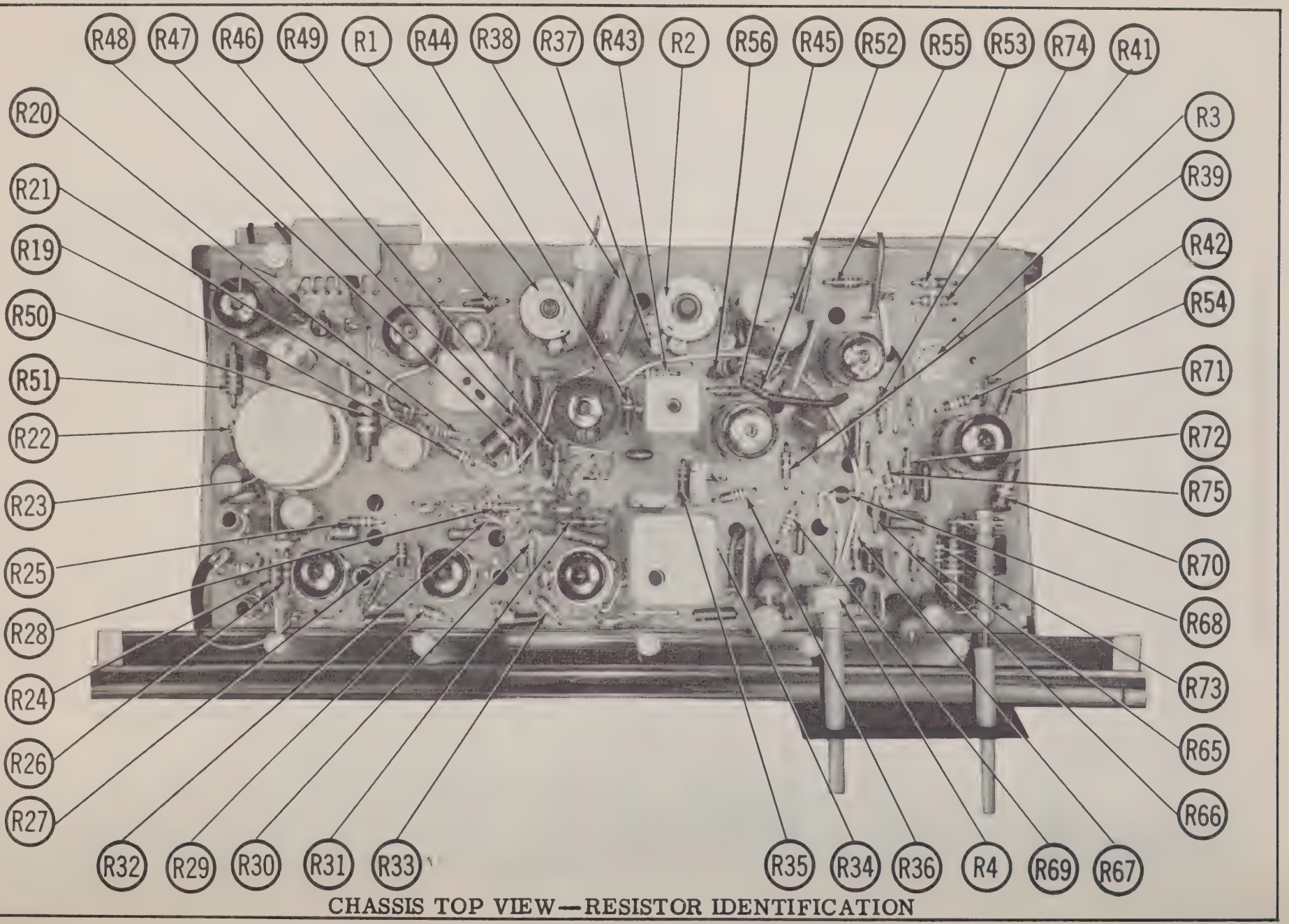


FIG. 4



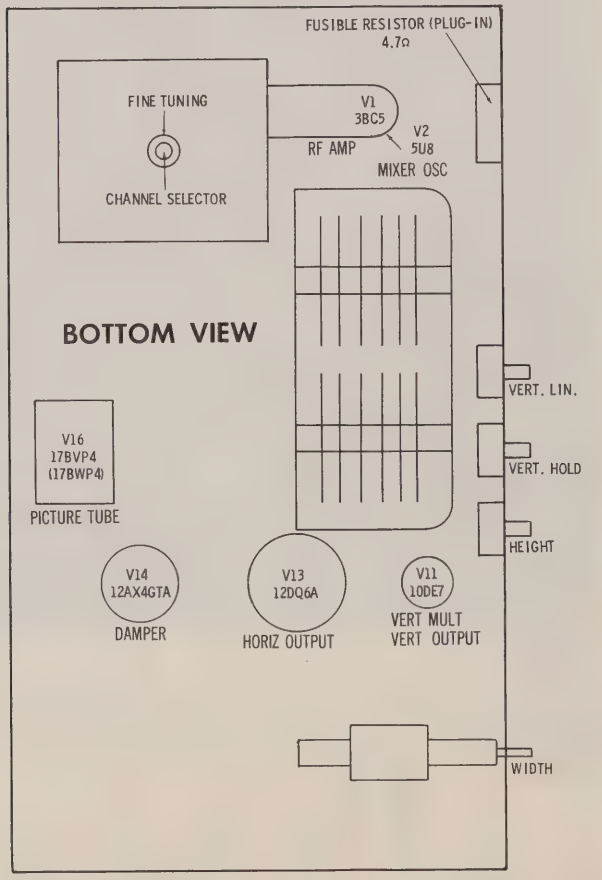
CHASSIS TOP VIEW—RESISTOR IDENTIFICATION

CHASSIS TOP VIEW — ALIGNMENT IDENTIFICATION

RESISTANCE MEASUREMENTS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	3BC5	620K	0Ω	11.5Ω	12Ω	†1400Ω	36000Ω	0Ω		
V2	5U8	†13.5K	165K	†6000Ω	12Ω	13.5Ω	†2400Ω	0Ω	0Ω	10K
V3	3BZ6	270K	47Ω	11.5Ω	11Ω	†1900Ω	†1900Ω	0Ω		
V4	3BZ6	.1Ω	180Ω	11Ω	10.5Ω	†1900Ω	†1900Ω	0Ω		
V5	3BZ6	.1Ω	180Ω	10Ω	10.5Ω	†2900Ω	†2900Ω	0Ω		
V6	12BY7A	27Ω	3300Ω	0Ω	6Ω	6Ω	4.5Ω	†5000Ω	†1400Ω	0Ω
V7	5BR8	†35K	180K	• †25K	4.5Ω	3.5Ω	†15K	†15K	150Ω	10K
V8	5T8	INF	27K	INF	2.5Ω	0Ω	550K	0Ω	10Meg	†470K
V9	5AQ5	470K	270Ω	3.5Ω	2.5Ω	†900Ω	†470Ω	470K		
V10	3CS6	†1Meg	0Ω	8.5Ω	7.5Ω	25K	†11K	1Meg		
V11	10DE7	†230Ω	• 1.2Meg	NC	16Ω	13.5Ω	• †5Meg	• 1.4Meg	0Ω	470Ω
V12	6CG7	†10K	1.7Meg	1000Ω	8.5Ω	10Ω	†47K	120K	1000Ω	0Ω
V13	12DQ6A	TP	22Ω	TP	†9000Ω	1Meg	TP	19Ω	0Ω	TOP CAP ‡15Ω
V14	12AX4GT	NC	TP	¶	NC	†26.5Ω	TP	19Ω	16Ω	
V15	1B3GT		PINS	1 THRU 8	HAVE	INFINTE	RESISTANCE			TOP CAP ‡253Ω
V16	17BVP4	NC	• 390K	7.5Ω	6Ω	24K	‡470K	‡470K		

† MEASURED FROM 255V SOURCE.
‡ MEASURED FROM PIN 3 OF V14.
• THIS READING WILL VARY. CONTROL SET FOR NORMAL OPERATION.
¶ THIS READING CAN VARY GREATLY, (10K MINIMUM), DUE TO THE CONDITION OF THE ELECTROLYTIC CAPACITOR CONNECTED IN THE ASSOCIATED CIRCUIT.
NC NO CONNECTION.
TP TIE POINT.

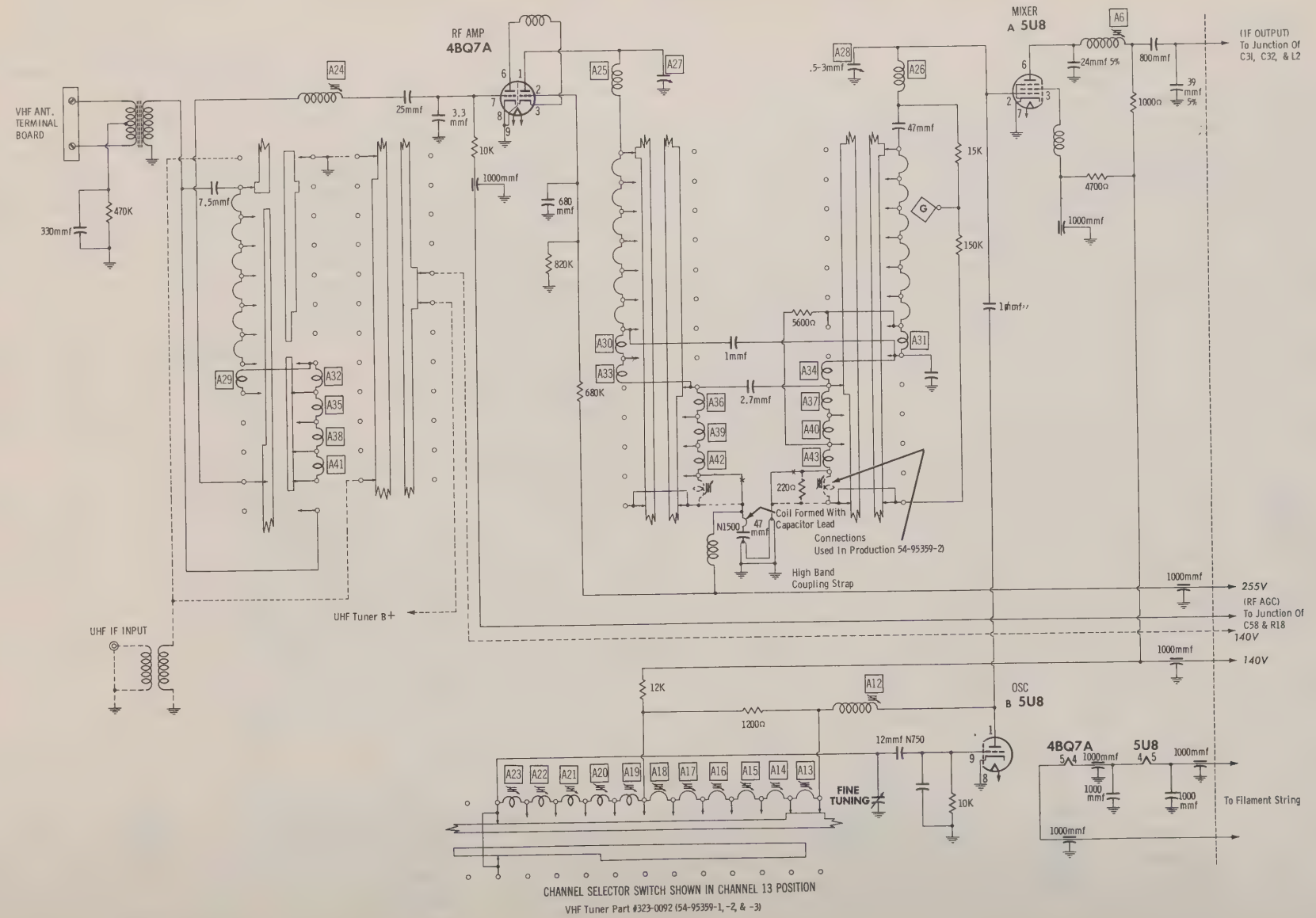


TUBE PLACEMENT CHART

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

ALTERNATE TUNER SCHEMATIC

(IF OUTPUT) To Junction Of C31, C32, & L2
140V
(RF AGC) To Junction Of C58 & R18
To Filament String
MIXER A 5AT8
OSC B 5AT8
RF AMP 3BC5
3BC5
5AT8
FINE TUNING
CHANNEL SELECTOR SWITCH SHOWN IN CHANNEL 13 POSITION
VHF Tuner Part #323-0091 (54-95803-1)
VHF ANT. TERMINAL BOARD
A PHOTOFACT STANDARD NOTATION SCHEMATIC
Howard W. Sams & Co., Inc. 1957



A PHOTOFACT STANDARD NOTATION SCHEMATIC
Howard W. Sams & Co., Inc. 1957

ALTERNATE TUNER SCHEMATIC

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

SYLVANIA MODELS 17P101, J, 17P102, 17P103, 17P201
(Ch. 1-537-1, -3, -4)

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	R.F Amplifier	3BC5	
V2	Mixer-Oscillator	6U8	
V3	1st Video IF Amp	3B26	
V4	2nd Video IF Amp	3B26	
V5	3rd Video IF Amp	3B26	
V6	Video Output	12BY7A	
V7	Sound IF Amp -AGC Keying	5BR6	
V8	Ratio Det.-AGC Clamper-AF Amp	6T8	

ITEM No.	USE	TYPE	NOTES
V9	Audio Output	5AQ5	
V10	Sync Separator	3C86	
V11	Vert Mult -Vert Output	10DE7	
V12	Horiz Mult	6CG7	
V13	Horiz Output	12DQ6A	
V14	Damper	12AX4GT	
V15	HV Rectifier	1B3GT	

PICTURE TUBE

ITEM No.	REPLACEMENT DATA			NOTES
	SYLVANIA PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	
V16	-7BVP4	-7BVP4	7BVP4A	1 Silver across '85
	-7BWP4	-7BWP4	7BWP4A	

ELECTROLYTIC CAPACITORS

ITEM No	RATING CAP.	VOLT	SYLVANIA PART No.	ABBOVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.	NOTES
C1	150	300	181-1033	PRI-100		FP151	TD-300-150	S-150	TVA-1575	
C2A	150	300	181-4033	PR4-350						
B	100	300								
C	20	300								
D	100	50								
C3A	40	300	181-3029	AFH3-98-40						
B	60	150								
C	25	25								
C4	2	50	181-1041	PR650V3	BSR3-50	TC308	TD-2-50	MT-0502	TVA-1301	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	VOLT	SYLVANIA PART No.	ABBOVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C5	6.8			NPO-81-6.8	TCZ-6R8	C10V68C	TCO-6.8	ZT-5568	STCCB-V68	NPO 5%
C6	27				TCN-27	C10Q27U	TCT-27			N750 5%
C7	1000			EF-001	MFT-1000				SOSC-DI	
C8	1000			BPD-001	DD-103	BYA8DI	ED-1000	DC82I	SHK-DI	
C9	1.5-4.2				S25-5		S33-5			
C10	1000			EF-001	MFT-1000				SOSC-DI	
C11	.68				TCZ-R68		TCO-.68			
C12	56									
C13	3.7									
C14	33									N150 5%
C15	5.3			NPO-81 2.2	TCZ-2R2	C10V22C	TCO-2.2		STCCB-V22	
C16	47									N150 5%
C17										
C18	1.3									
C19	1000			EF-001	MFT-1000				SOSC-DI	
C20	3.9									5%
C21	1000			BPD-001	DD-103	BYA8DI	ED-1000	DC82I	SHK-DI	
C22	39									N150 5%
C23	10			N750-81 10	TCN-10	C10QU	TCT-10	NT-841	STCU-QI	N750
C24	5									N2200
C25	1000			EF-001	MFT-1000				SOSC-DI	
C26	1000			BPD-001	DD-103	BYA8DI	ED-1000	DC82I	SHK-DI	
C27	1000			EF-001	MFT-1000				SOSC-DI	
C28	1000			BPD-001	DD-103	BYA8DI	ED-1000	DC82I	SHK-DI	
C29	1000			BPD-001	DD-103	BYA8DI	ED-1000	DC82I	SHK-DI	
C30	1000			EF-001	MFT-1000				SOSC-DI	
C31	47		186-0047P	DS-470		LT6Q47	GP-47	UC-5647	SGA-Q47	①
C32	5.2		181-0033	NPO-81 5.2	TCZ-5.2	C10V5EC	TCO-5.2		STCCB-V52	NPO 5%
C33	51		186-0051							NPO 5%
C34	1000		186-1000D	BPD-01	DD-103	BYA8DI	ED-1000	DC82I	SHK-DI	
C35	1000		189-0016	P2S6N-S2		CUBSP3S		GEM-3216	ZTM-P2S	②
C36	.15	200	182-0291	P2S5N-15		CUBSP1S		GEM-3015	ZTM-P15	10%
C37	470		186-0470			L20T47	ED-470			
C38	47			NPO-81 47	TCZ-47	C10Q47C	TCT-47	ZT-5647	STCC-Q47	NPO 5%
C39	560		186-0560				ED-560			10%
C40	750		186-0750		DS-37I					5%
C41	800		186-0800				ED-0008			10%
C42	1000		186-1000D	BPD-001	DD-103	BYA8DI	ED-1000	DC82I	SHK-DI	
C43	10		186-0010	S2 10	DS-100	L20Q	ED-10	GP-10	SGA-Q	
C44	10		186-0010	S2 10	DS-100	L20Q	ED-10	GP-10	SGA-Q	
C45	1000		186-1000D	BPD-001	DD-103	BYA8DI	ED-1000	DC82I	SHK-DI	
C46	1000		186-1000D	BPD-001	DD-103	BYA8DI	ED-1000	DC82I	SHK-DI	
C47	.047	300	183-0333	183-0333						10%
C48	150		186-0150	NPO-81 150	DS-151	L20T15	ED-150			10%
C49	68		182-0068	1468-000068	DS-680	22S5Q68	ED-68		MS-685	10%
C50	.22	600	183-04022	P468N-S3		CUBSP3S		GEM-4022	4TM-P23	
C51	.01	600	180-0611	P468N-01	DS-103	CUB68U	GP-10000	GEM-611	6TM-61	
C52	.01	500	182-0103	1468-0001	DS-103	22S5T1	ED-100	MCB355	MS-31	10%
C53	4700		186-4700D	BPD-0047	DD-472	BYA10D47	ED-0047	UC-5247	5HK-D47	
C54	4700		186-4700D	BPD-0047	DD-472	BYA10D47	ED-0047	UC-5247	5HK-D47	
C55	.0047	600	180-0247					GEM-16247		10%
C56	2200	1000	174-1202	DAC-4	MD-223	BYA10D22	RDS5-2200	DCM2223	5HK-D22	
C57	.47	600	180-0547	P368N-47		CUBJP4T		GEM-3047	3TM-P47	
C58	.1	300	180-0691					GEM-301		10%
C59	.047	600	180-0447	P488N-047	DY-503	CUB4S47		GEM-4047	4TM-S47	
C60	1000		186-1000D	BPD-001	DD-103	BYA8DI	ED-1000	DC82I	SHK-DI	③
C61	.047	300	180-0247	P368N-047		CUBJP3T		GEM-4147	3TM-P47	
C62	.1	400	182-0401	P488N-1	DY-104	CUB4P1		GEM-401	4TM-P1	
C63	.01	300	183-0691					GEM-1611		10%
C64	.001	600	183-0681					GEM-1621		10%
C65	.0022	1000	186-0063							10%
C66	.22	600	180-06022	P688N-23		CUBEP2S		GEM-6022	6TM-P22	10%
C67	.033	600	180-06233							10%
C68	.047	600	180-0647	P488N-047	DY-503	CUB4S47		GEM-4147	4TM-S47	
C69	.1			P488N-1	DF-104	CUB4P1		GEM-401	4TM-P1	
C70	.22	300	180-06022	P288N-23		CUBJP23		GEM-3022	2TM-P22	④
C71	.22	300	180-06023	P288N-23		CUBJP23		GEM-3023	2TM-P23	⑤
C72	100		183-0681	1489-0001	DD-101	22S5T1	ED-100	MCB235	MS-31	10%
C73	82		182-0082	1468-000082	DD-820	22S5Q82	CT05C1S20G		MS-482	10%
C74	1000		186-1000			18S1X	ED-1000	MCB355	MS-31	10%
C75	.0047	300	180-0247					GEM-16247		10%
C76	.047	300	183-0247	P288N-047	DF-503	CUB2S47		GEM-4147	2TM-S47	
C77	.0047	600		P688N-0047	DS-472	CUB6D47	GP-4700	GEM-6247	6TM-D47	

CAPACITORS (cont)

ITEM No.	RATING CAP.	VOLT	REPLACEMENT DATA SYLVANIA PART No.	ABBOVOX	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C78	1000		186-1000			UR5B	ED-1000	MCB355	MS-31	10%
C79	1000		186-1000			18S1B	ED-1000	MCB355	MS-31	10%
C80	100		183-0101	1469-0001	DS-101	22S5T1	ED-100	MCB235	MS-31	10%
C81	330		183-03330	1469-00033		18S1T33	ED-330		MS-333	5%
C82	680		183-0681	1464-00068		18S1T68	ED-680		MS-368	5%
C83	4700			BPD-0047	DD-472	BYA10D47	ED-0047	UC-5247	5HK-D47	
C84	.047	600	180-0447	P488N-047	DF-503	CUB4S47		GEM-4147	4TM-S47	⑥
C85	.033	600	180-06133	P688N-033	DF-303	CUB6S33		GEM-6133	6TM-S33	
C86	.022	300	180-06223	P388N-022	DD-303	CUB3S22		GEM-6123	3TM-S22	
C87	470	4000	174-0471	HVD-50-470	DD60-471	HVB50T47	HD6-470		50GA-T5	
C88	.027	600	180-06127							10%
C89	.68	600	180-0681							10% ⑦
C90	5000	900VAC	189-0060							
C91	1000		186-1000D	BPD-001	DD-102	BYA8DI	ED-1000	DC82I	8HK-DI	
C92	1000		186-1000D	BPD-001	DD-103	BYA8DI	ED-1000	DC82I	8HK-DI	
C93	1000		186-1000D	BPD-001	DD-103	BYA8DI	ED-1000	DC82I	8HK-DI	
C94	1000		186-1000D	BPD-001	DD-103	BYA8DI	ED-1000	DC82I	8HK-DI	
C95	1000		186-1000D	BPD-001	DD-103	BYA8DI	ED-1000	DC82I	8HK-DI	
C96	1000		186-1000D	BPD-001	DD-103	BYA8DI	ED-1000	DC82I	8HK-DI	
C97	1000		186-1000D	BPD-001	DD-103	BYA8DI	ED-1000	DC82I	8HK-DI	
C98	4700		186-4700D	BPD-0047	DD-472	BYA10D47	ED-0047	UC-5247	5HK-D47	
C99	4700	1000	189-0067		MD-472	BYA10D47	HD8-4700		5GA-D47	
C100	4700	1000	189-0067		MD-472	BYA10D47	HD8-4700		5GA-D47	

1. Some versions may use 390MMF, 5% (Part #186-0023), 22MMF (Part #186-0022), 15MMF, NPO (Part #186-0015), or it may be omitted
2. Not used in some versions.
3. Some versions use .33MFD in this application.
4. Some versions use .022MFD,400V, 10% (Part #180-06122) in this application.
5. Some versions may use .47MFD, 300V (Part #180-06047) in this application.
6. Some versions use .033MFD in this application.

CONTROLS

ITEM No	RATING RESIST ance	WATTS	REPLACEMENT DATA SYLVANIA Part No.	CENTRALAB	CLAROSTAT Part No.	IRC Part No.	MALLORY Part No	INSTALLATION NOTES
R1	250K	½	183-0231					Volume - Note 1
R2	15K	½	183-0233					Contrast - Tap ⑤ 5000Ω-
								Note 2
R3A	1Meg	½	182-0039	B-69	A47-1Meg-d	QI-137	U94	Brightness -Note 3
B	Shaft			Not Req.	RIM-3	Not Req.	Not Req.	
C	Switch			KS-1	SWS-12	76-1	US-26	
R4	150K	½	183-0232					AGC - Note 4
R5A	1Meg	½	183-0244	AB-89	A47-1Meg-d	QI-137	PTA1284L	Vert. Lin. - Note 5
B	Shaft			Not Req.	RM-3	TQ	Not Req.	
R6A	1Meg	½	183-0184	AB-89	A47-1Meg-d	QI-137	PTA1284L	Vert. Hold - Note 6
B	Shaft			Not Req.	RM-3	TQ	Not Req.	
R7A	3.5Meg	½	183-0235	AB-88	A47-1.5Meg -9	QI-329		Height
B	Shaft			Not Req.	RM-3	TQ		

1. Alternate part #183-0135 may be used in later versions
2. Alternate part #183-0136 may be used in later versions.
3. Alternate part #183-0038 (1Meg with 330K stop) may be used in later versions.
4. Alternate part #183-0133 (250K with 15K stop) or part #183-0188 may be used in some versions
5. Alternate part #183-0137 may be used in later versions.
6. Alternate part #183-0130, 1.5Meg may be used in later versions.

RESISTORS

All wattages ½ watt, or less, unless otherwise listed.

ITEM No.	RATING OHMS	WATT	REPLACEMENT DATA SYLVANIA PART No.	IRC PART No.	NOTES
R8	150Ω			BTS-150Ω	
R9	10K			BTS-10K	
R10	4700Ω			BTS-4700	
R11	2200Ω			BTS-2200	
R13	12K			BTS-12K	
R14	15K			BTS-15K	
R15	150K			BTS-150K	
R16	100KΩ			BTS-100K	
R17	470Ω			BTS-470	
R18	9.9Meg 9%			BTS-9.9Meg	
R20	470K 5%			BTS-470K	
R21	100K		181-0045		
R22	100K 5%		181-0045	BTS-100K 5%	Note 3
R23	220K		181-0224		
R24	68Ω 5%		181-0682S		
R25	470Ω		181-0471	BTS-470	
R26	47Ω		181-0470	BTS-47	
R27	82Ω		181-0820	BTS-820	
R28	470Ω		181-0471	BTS-470	
R29	180Ω		181-0181	BTS-180	
R30	18K		181-0183	BTS-18K	
R31	1000Ω		181-0102		
R33	470Ω		181-0471		
R35	180Ω		181-0181	BTS-180	
R34	330Ω		181-0332	BTS-330Ω	
R35	10K		181-0103	BTS-10K	
R36	39K		181-0393	BTS-39K	
R37	3300Ω	2	189-0079		
R38	2700Ω	4	189-0080		
R39	27Ω		181-0270	BTS-27	
R40	500K		189-0081		Note 5
R41	470K		181-0474	BTS-470K	Note 5
R42	470K		181-0474	BTS-470K	Note 5
R43	47K		181-0473	BTS-47K	Note 3
R44	150K		181-0154	BTS-150K	
R45	10K		181-0103	BTS-10K	
R46	10K		181-0103	BTS-10K	
R47	15K	2		BTS-15K	

ITEM No.	RATING OHMS	WATT	REPLACEMENT DATA SYLVANIA PART No.	IRC PART No.	NOTES
R48	150Ω		181-0151	BTS-150	
R49	27K		181-0273	BTS-27K	
R50	4700Ω	2	183-0471	BTS-470	
R51	270Ω	1	183-0271	BTA-270	
R53	1Meg 5%			BTS-1Meg 5%	
R54	100K		181-0048	BTS-100K	Note 7
R54	47K		181-0473	BTS-47K	Note 8
R55	27K		181-0273	BTS-27K	Note 3
R56	10K	1	182-0103	BTA-10K	
R57	33K		181-0333	BTS-33K	
R58	18K		181-0183	BTS-18K	
R59	1.2Meg		181-0125	BTS-1.2Meg	
R60	1Meg		181-0105	BTS-1Meg	
R61	4700	2	183-0471	BTS-470	Note 9
R62	3.9Meg		181-0395	BTS-3.9Meg	Note 10
R63	2200Ω				
R64	2200Ω		181-0205		
R65	1Meg		181-0105		
R66	2700Ω		181-0272		
R67	820K		181-0824		
R68	1Meg		181-0105		
R69	47K		181-0473		
R70	10K	1	182-0103		
R71	1000Ω 5%		181-0102S		
R72	120K 5%				Note 11
R73	47K		181-0473		
R74	270Ω		181-0271		Note 12
R75	2200Ω		181-0222		
R76	220Ω		181-0221	BTS-220	
R77	1Meg			BTS-1Meg	Note 13
R78	220Ω		181-0221	BTS-220	
R79	8200Ω	2	183-0823	BTS-8200	
R80	4700Ω			BTS-4700	
R81	4700Ω		181-0473	BTS-4700	
R82	1000Ω	10	187-0026	PW10-1000	
R83	390Ω	5	187-0018		
R84	4.7Ω		187-0053		
R85	68Ω	20	187-0052		
R86	3300Ω		181-0332	BTS-3300	

RESISTORS (cont)

ITEM No.	RATING OHMS	WATT	REPLACEMENT DATA SYLVANIA PART No.	IRC PART No.	NOTES
R87	3300Ω		181-0332	BTS-3300	Note 10
R88	470K		181-0474	BTS-470K	Note 19

Note 1 Some versions may use 2.7Meg 5% (Part #181-02755) in this application.
Note 3. Some versions may use 100K 5% in this application.
Note 3. Some versions may use 56K in this application.
Note 4. Some versions may use 33000 in this application.
Note 5. Some versions may use 470K1Meg or special 500K temperature compensating resistor (Part #189-0082) in this application.
Note 6 Some versions may use a 180K in this application.
Note 7. Some versions may use 220K 5% in this application.
Note 8. Some versions may use 82K (Part #181-0382) in this application.
Note 9. Some versions may use a 180Ω in this application.
Note 10. Not used in some versions.
Note 11. Some versions may use 100K 5% (Part #181-01045) in this application.
Note 12. Manufacturer recommends 5% replacement.
Note 13. Some versions may use 560K in this application.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No	USE	REPLACEMENT DATA SYLVANIA PART No.	Halldorson Part No.	Merit Part No.	Ram Part No.	Stancor Part No.	Thordarson Part No.	Triad Part No.	NOTES
T1	Vert. Output	241-0045					A-8148 ③	25678J③	113X
T2A	Yoke-Horiz. (20.5MH)	190-0031 ②	Z1900 ①		MDF-110				
B	(10 ④ Vert. (3.5MH)								
T3	Horiz. Output	241-0046			HVO-126				
T4	Width Coil (0-47MH)	132-0018							

① Use 8 to 1 turns ratio.
② Connect as auto transformer.
③ Drill new mounting hole(s).
④ Includes resistors R83 and R84.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI	SEC.	REPLACEMENT DATA SYLVANIA PART No.	Merit Halldorson Part No.	Stancor Part No.	Thordarson Part No.	Triad Part No.	NOTES
T5	5200Ω	3-4Ω	143-0080	23118	A-3036	A-3332	24848	S-4X

SPEAKER

ITEM No.	TYPE SIZE	FIELD	V. C. IMP.	REPLACEMENT DATA SYLVANIA PART No.	QUAM PART No.	NOTES
SP1	4"	PM	3-4Ω	539-0423	4A1	

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA SYLVANIA PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	47.25MC Trap	118-0033				
L2	1st. Video IF	130-0023				
L3	2nd. Video IF	119-0023				Included 41.25MC Trap
L4	3rd. Video IF	119-0021				
L5	4th. Video IF	119-0022				Includes Cap.
L6	RF Choke	118-0030		10-1006	BC-566	6613 13 Microhenries
L7	RF Choke	118-0030		10-1006	BC-566	6613 13 Microhenries
L8	Shunt Peaking Coil	131-3033		10-3300	TV-190	6130 330 Microhenries
L9	Series Peaking Coil	131-3034		10-3180	TV-184	6130 180 Microhenries
L10A	4.5MC Trap	130-0018				
B	Sound IF					
L11	Ratio Detector	138-0015				Includes 2 resistors and cap.
L12	RF Choke	118-0030				13 Microhenries
L13	RF Choke	118-0010		10-1006	BC-566	6613 13 Microhenries
L14	RF Choke	118-0010		10-1006	BC-566	6613 13 Microhenries
L15	Line Choke	145-0027				119 Microhenries, Note 1
L16	Line Choke	145-0027				119 Microhenries, Note 1
L17	Fil. Choke	118-0023		10-1000	BC-561	6603 1.2 Microhenries
L18	Fil. Choke	118-0023		10-1000	BC-561	6603 1.2 Microhenries
L19	Fil. Choke	118-0022		10-1000	BC-561	6603 13 Microhenries

Note 1. Not used in some versions.

TRANSFORMER (HORIZ. OSC.)

ITEM No.	DC RES. PRI	SEC.	SYLVANIA PART No.	MEISSNER PART No.	MERIT PART No.	RCA TYPE No.	Ram PART No.	Thordarson PART No.	NOTES
L20	40Ω		132-0017						11-55 Millihenries Includes .0047 Cap.

FILTER CHOKE

ITEM No.	RATINGS TOTAL DIRECT	D. C. RESISTANCE	INDUCTANCE (D CURRENT (MA)	SYLVANIA PART No.	REPLACEMENT DATA Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L21	.210A	23Ω	18H	145-0020	C5041		C-3228	23C44	

COMPONENT COMBINATIONS

ITEM No	USE	DESCRIPTION	SYLVANIA PART No.	REPLACEMENT DATA
K1	Antenna Isolation	470MMF, .2-1Meg	190-0036	Centralab RC-471
K2	Antenna Isolation	470MMF, .3-1Meg	190-0036	Centralab RC-471
K3	Vertical Retrace Blanking Coupler	10000MMF, 3300MMF, 33K, 22K, 15K, 47K	190-0031 ①	
K4	De-emphasis Coupler	1000MMF, 4000MMF, 10000MMF 82K	190-0034	Centralab PC-334
K5	Audio Coupler	5000MMF, 250MMF, 5000MMF, 250MMF, 10Meg, 470K, 470K	190-0033	
K6	Sync Sep. Coupler	270MMF, 10000MMF, 1Meg, 330K	190-0032 ②	

① Some versions use 6800MMF, 3300MMF, 33K, 15K, 22K, 47K coupler Part #190-0037 in this application.
② Some versions use 270MMF, 10000MMF, 330K coupler Part #190-0036 in this application.

SYLVANIA MODELS 17P101 J, 17P102, 17P103, 17P201 (Ch. K-537-J, -3, -4)

FOLDER 3

PARTS LIST AND DESCRIPTIONS (Continued)

RECTIFIERS

ITEM No.	RATING	REPLACEMENT DATA					NOTES
	CURRENT (Measured)	SYLVANIA PART No.	FEDERAL PART No.	GENERAL ELECTRIC PART No.	INTERNATIONAL PART No.	SARKES TARZIAN PART No.	
M1	.310A	517-0010 ①	1179A ①	1N1008 ②	RS450SL ①	500 ①	① Selenium Type
M2	.310A	517-0010 ①	1179A ①	1N1008 ②	RS450SL ①	500 ①	② Germanium Type
M3		624-0006 ①	1215 ③		1T1 ③		③ Two required

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA			NOTES
		SYLVANIA PART No.	CBS PART No.	SYLVANIA PART No.	
M4	1N295	1N295	1N60	1N34A	Video Detector (Pigtail)

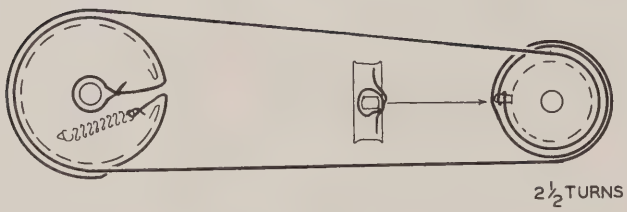
MISCELLANEOUS

ITEM No.	PART NAME	SYLVANIA PART No.	NOTES
M5	Tuner	323-0091	VHF (54-94698-1, -3, 54-95803-1, -2) Used in Ch. 537-1
	Tuner	323-0092	VHF (54-95359-1, -2, -3, -5) Used in Ch. 537-3, -4
	Tuner	323-0090	VHF (54-95604-1, -5) Used in Ch. 537-3, -4
	Tuner	323-0089	UHF (54-93870-4) Used in Ch. 537-4
M6	Centering Device	400-0034	Includes yoke rear cover
M7	Ion Trap	400-0033	

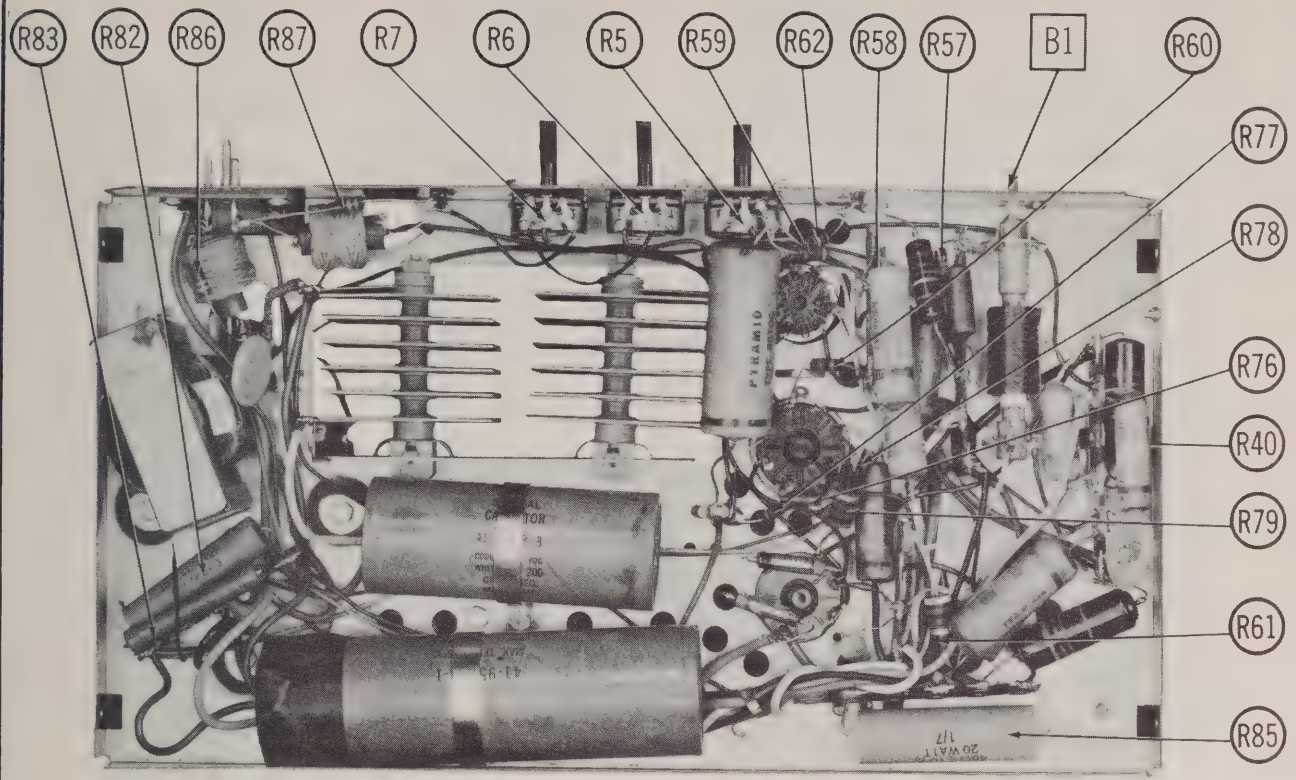
CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

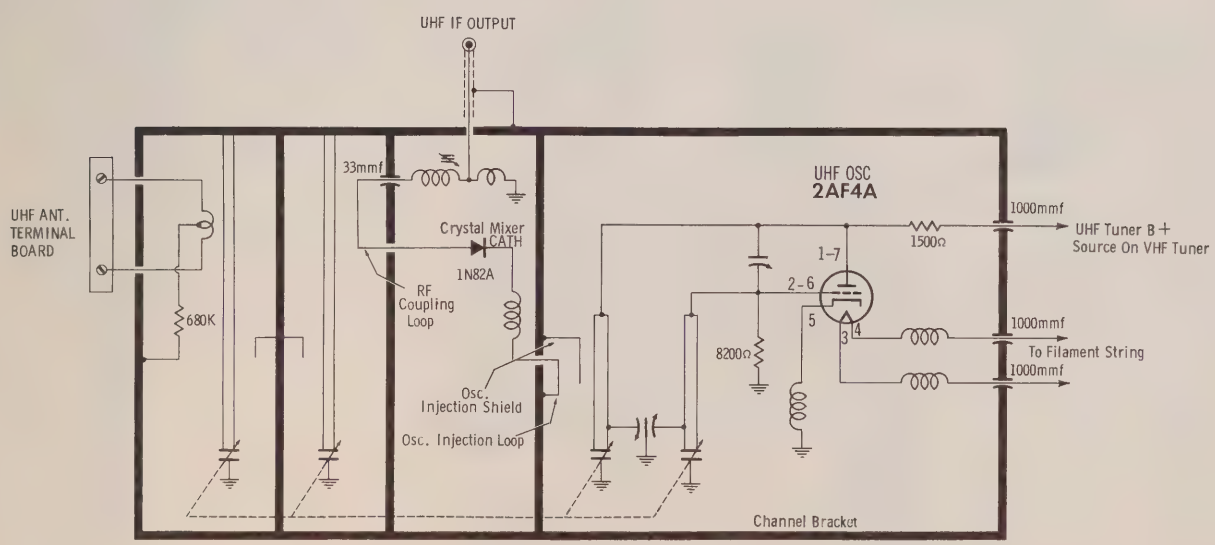
NAME	PART NO.	DESCRIPTION
Escutcheon	715-0018	Model 17P102
Escutcheon	751-0020	Model 17P201
Knob	743-0057	VHF Channel Selector (Model 17P101)
Knob	743-0058	VHF Channel Selector (Models 17P102, 17P201)
Knob	743-0059	UHF Channel Selector , VHF Fine Tuning (UHF Models)
Knob	740-0154	UHF Fine Tuning (UHF Models)
Knob	740-0151	VHF Fine Tuning (VHF Models)
Knob	740-0150	On-off-brightness (Model 17P101)
Knob	740-0153	On-off-brightness (Models 17P102, 17P201)
Knob	740-0149	Volume - contrast
Knob	748-0006	Dummy



UHF DRIVE CORD STRINGING



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION



UHF Tuner Part #323-0089 (54-93870-4)

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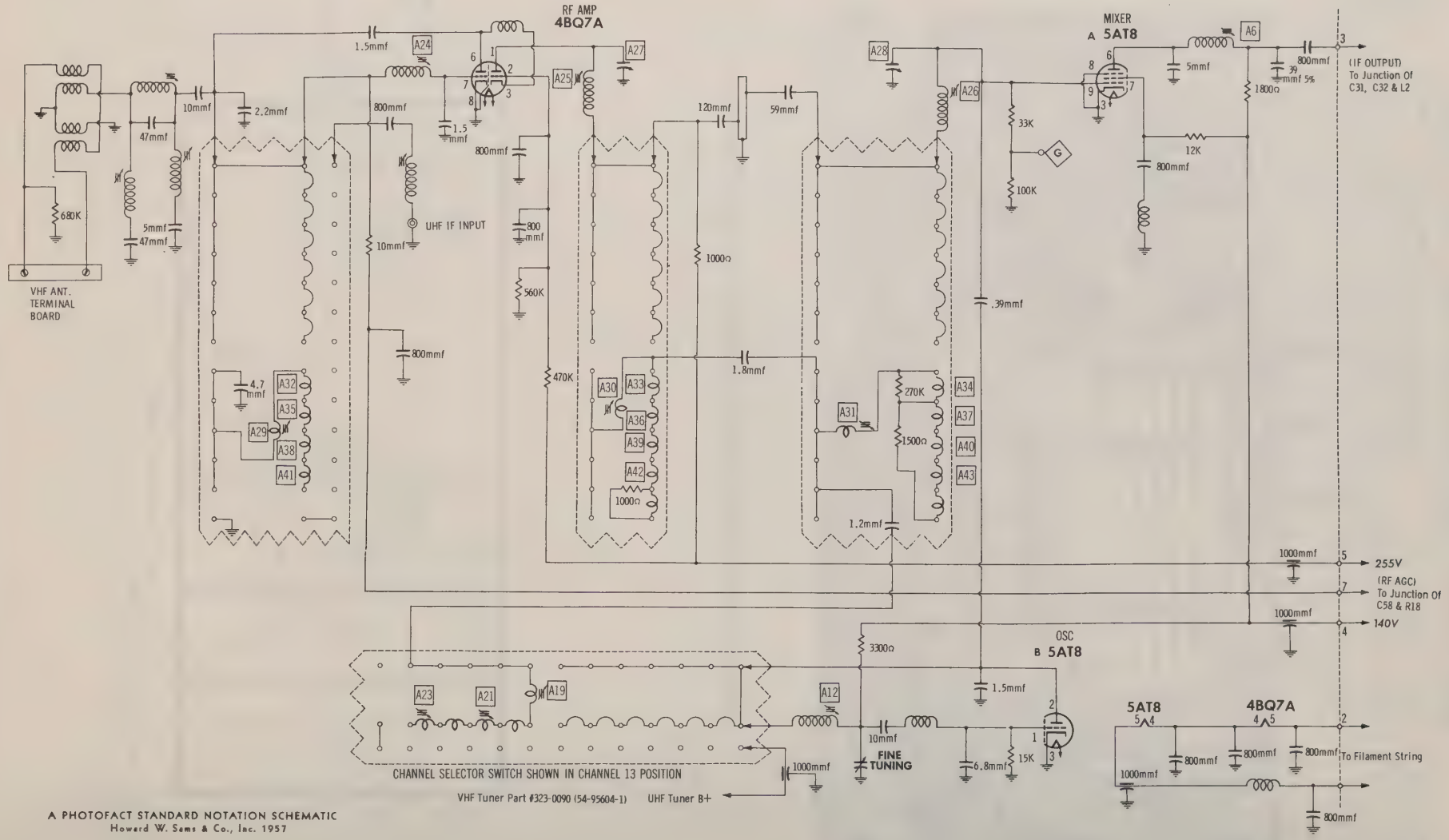
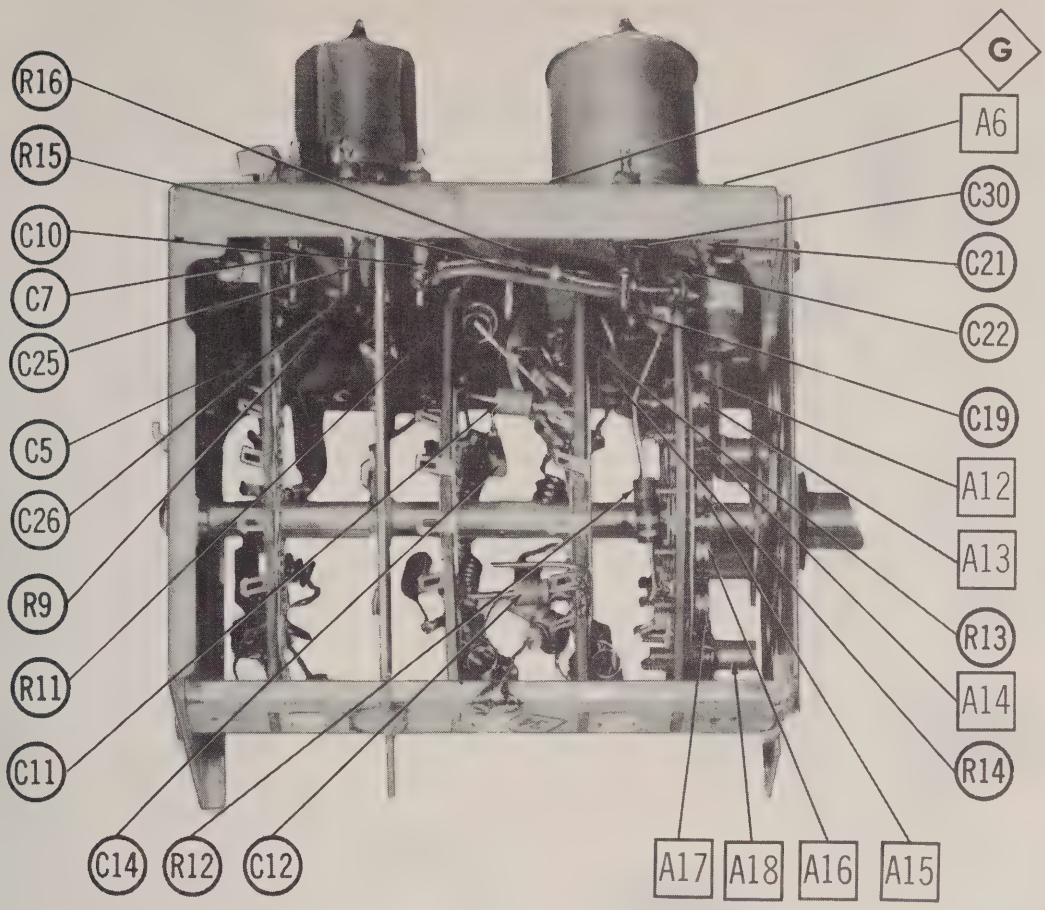
ALTERNATE TUNER SCHEMATIC



ALTERNATE TUNER SCHEMATIC



RF TUNER-RIGHT SIDE

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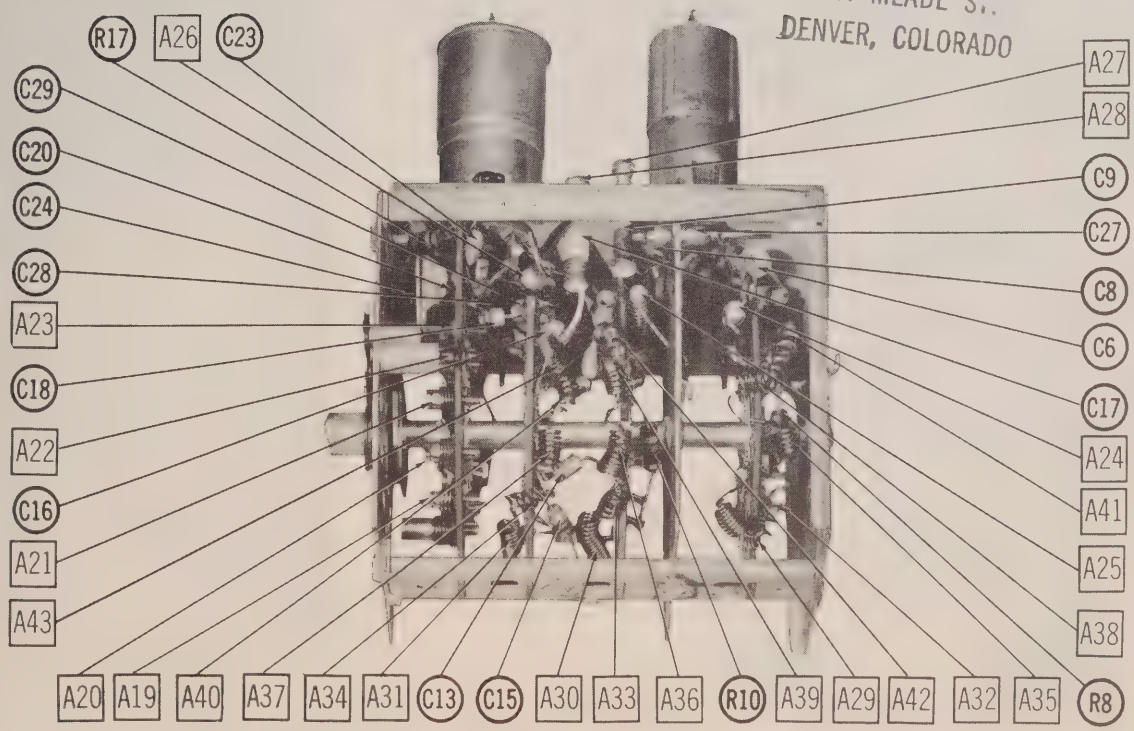
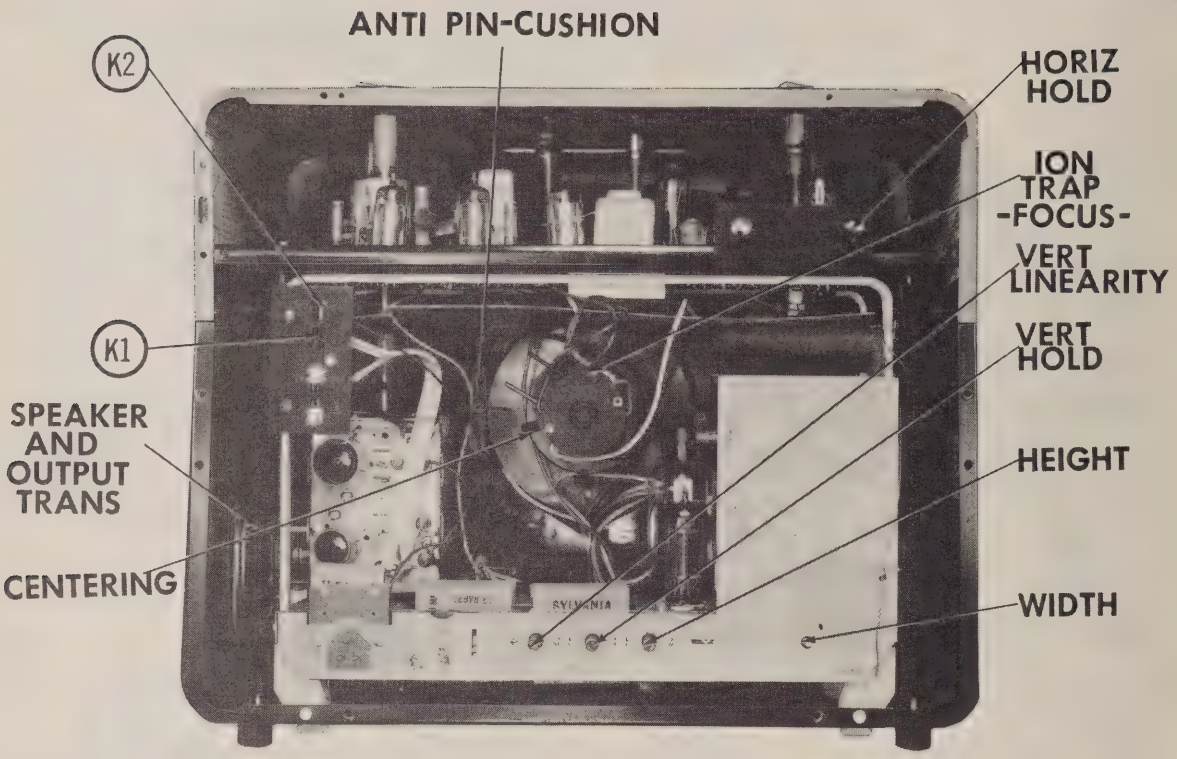


RF TUNER-LEFT SIDE

FOLDER 3



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably with a test pattern.

Set the brightness and contrast controls for a normal picture.

Turn the horizontal hold control clockwise until the picture loses sync. It may be necessary to switch off channel and back again for picture to lose sync.

Turn the horizontal hold control slowly counter clockwise until the picture just falls into sync.

Adjust width slug (B1) for picture SLIGHTLY wider than necessary to fill picture mask.

PHOTOFACT* Folder

*TRADE MARK

ZENITH MODELS Z1812RZ, Z1812RZU (Ch. 15Z30, 15Z30U)

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ZENITH MODELS Z1812RZ, Z1812RZU
(Ch. 15Z30, 15Z30U)

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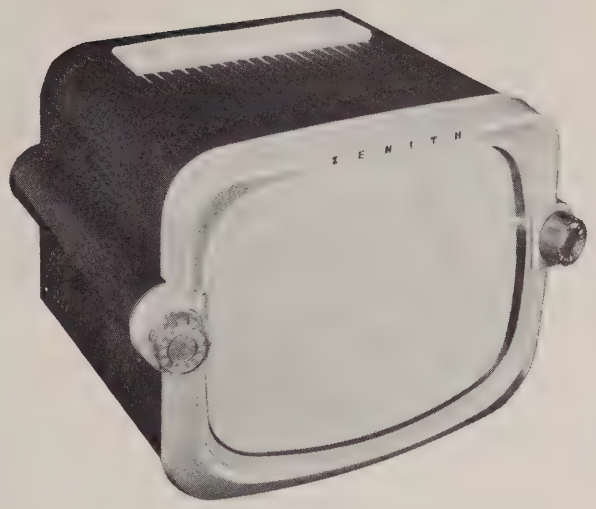
DISASSEMBLY INSTRUCTIONS

CABINET REMOVAL

1. Remove 4 push-on type knobs from the top.
2. Remove 10 metal screws and the rear cover.
3. Remove 2 speaker leads.
4. Remove 4 metal screws from the top and bottom chassis braces at the rear of the cabinet.
5. Remove chassis from the front of the cabinet.



CAUTION NOTE

ONE SIDE OF AC LINE CONNECTED TO CHASSIS
Care should be exercised when connecting test equipment or physically contacting the chassis.

TRADE NAME	Zenith	MODELS	CHASSIS
		Z1812RZ	15Z30
		Z1812RZU	15Z30U
MANUFACTURER	Zenith Radio Corp., 6001 Dickens Ave., Chicago 39, Illinois		
TYPE SET	Television Receiver		
TUBES	Fifteen		
POWER SUPPLY	110-120 Volts AC, 60 Cycle	RATING	140 Watts, 1.3 Amp. @ 117 Volts AC
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)		

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustment of the VHF oscillator is possible by removing the channel selector and fine tuning knobs. Set the fine tuning at the center of its range. The adjustments (located in a circle around the shaft) should be made in sequence from the highest to the lowest channel in the area. Channel 13 adjustment is located at 11 o'clock, proceed in counter clockwise direction adjusting for best picture and sound.

PICTURE TUBE SAFETY GLASS CLEANING

Remove the 2 front knobs. Remove 4 metal screws and 2 escutcheons. Remove the safety glass.

SPECIAL ADJUSTMENTS

A. AGC
Observe the picture and advance the AGC control to a point where the picture distorts or a buzz is heard in the sound. Back off from this setting until the picture becomes stable with no noise in the sound.

B. Focus
Adjust the ion trap for the best focus consistent with maximum brightness.

C. Width
The width may be varied by means of a metallic sleeve located between the yoke and the picture tube neck. Adjust sleeve in or out of the yoke for a picture SLIGHTLY larger than necessary to fill the screen.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Set the horizontal hold control to the center of its range and adjust the coarse horizontal hold control until the picture is synchronized horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate audio detector buzz, adjust the buzz control for MINIMUM buzz and maximum sound. (For location, see tube placement chart).

FUSES

A 6Ω fusible resistor (R93) is used for LV power supply protection. (For location, see tube placement chart).

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube. Rotate the two rings around the neck of the tube until the picture is properly centered.

ZENITH MODELS Z1812RZ, Z1812RZU
(Ch. 15Z30, 15Z30U)

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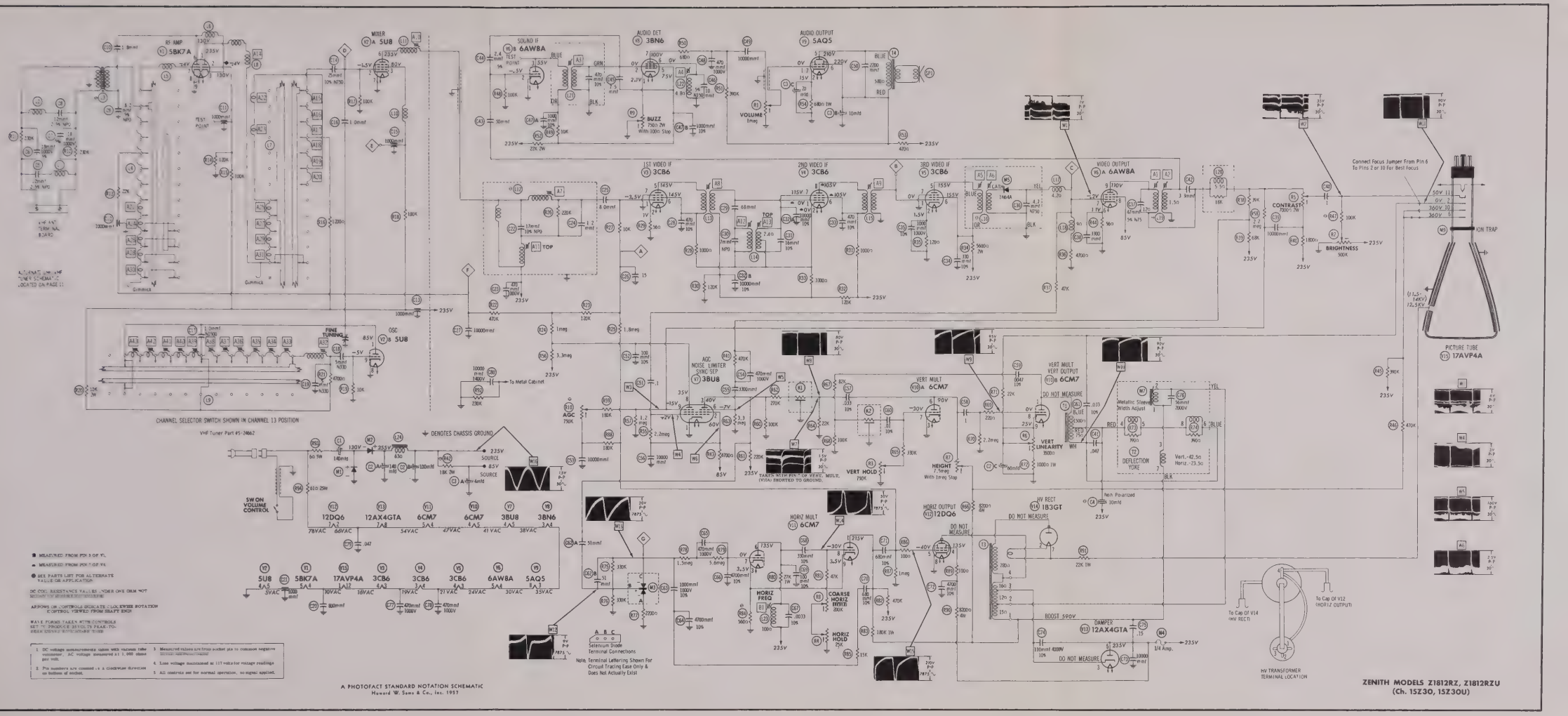
RF AMP 5BK7A
MIXER V2A 5U8
SOUND IF V2B 6AW8A
AUDIO DET V3 3BN6
AUDIO OUTPUT V3 5AQ5
1ST VIDEO IF V4 3CB6
2ND VIDEO IF V4 3CB6
3RD VIDEO IF V5 3CB6
VIDEO OUTPUT V5 6AW8A
OSC V2B 5U8
AGC NOISE LIMITER SYNC SEP V1 3BU8
VERT MULT V10A 6CM7
VERT MULT VERT OUTPUT V10B 6CM7
HORIZ MULT V11 6CM7
HORIZ OUTPUT V12 12DQ6
HV RECT V14 1B3GT
DAMPER V13 12AX4GTA
PICTURE TUBE V15 17AVP4A
ION TRAP
CONTRAST
BRIGHTNESS
VOLUME
FINE TUNING
VERT HOLD
HEIGHT
VERT LINEARITY
HORIZ FREQ
COARSE HORIZ
HORIZ HOLD
BOOST 590V
DEFLECTION YOKE
Metallic Sleeve Width Adjust
Connect Focus Jumper From Pin 6 To Pins 2 or 10 For Best Focus
CHANNEL SELECTOR SWITCH SHOWN IN CHANNEL 13 POSITION
VHF Tuner Part #S-24662
DENOTES CHASSIS GROUND
SW ON VOLUME CONTROL
12DQ6 12AX4GTA 6CM7 6CM7 3BU8 3BN6
5U8 5BK7A 17AVP4A 3CB6 3CB6 3CB6 6AW8A 5AQ5
78VAC 66VAC 54VAC 47VAC 41 VAC 38VAC
5VAC 10VAC 12 16VAC 19VAC 21 VAC 24VAC 30VAC 35VAC
TAKEN WITH PIN 5 OF VERT. MULT. (V10A) SHORTED TO GROUND.
Selenium Diode Terminal Connections
Note, Terminal Lettering Shown For Circuit Tracing Ease Only & Does Not Actually Exist
To Cap Of V12 (HORIZ OUTPUT)
To Cap Of V14 (HV RECT)
HV TRANSFORMER TERMINAL LOCATION
1/4 Amp.
DO NOT MEASURE
Non Polarized
1. DC voltage measurements taken with vacuum tube voltmeter. AC voltage measured at 1,000 ohms per volt.
2. Pin numbers are counted as a clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative
4. Line voltage maintained at 117 volts for voltage readings
5. All controls set for normal operation, no signal applied.

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ZENITH MODELS Z1812RZ, Z1812RZU (Ch. 15Z30, 15Z30U)

TUBE PLACEMENT CHART

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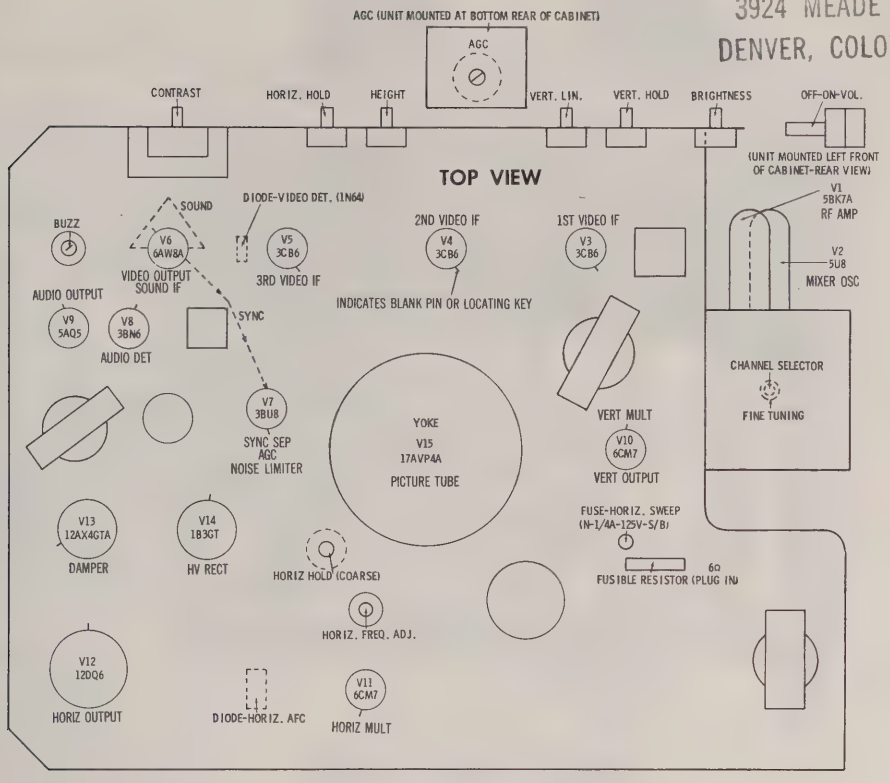


TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

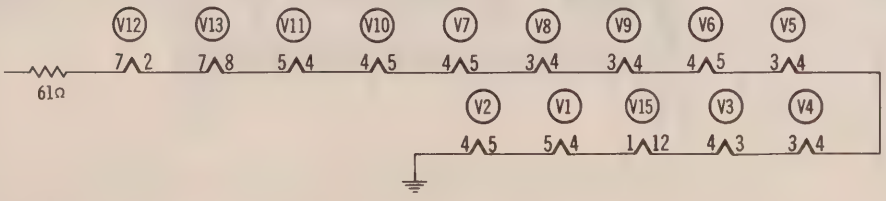
POWER SUPPLY FAILURE
No raster, no sound - Fusible Resistor (R93), Rectifier (M1, M2)

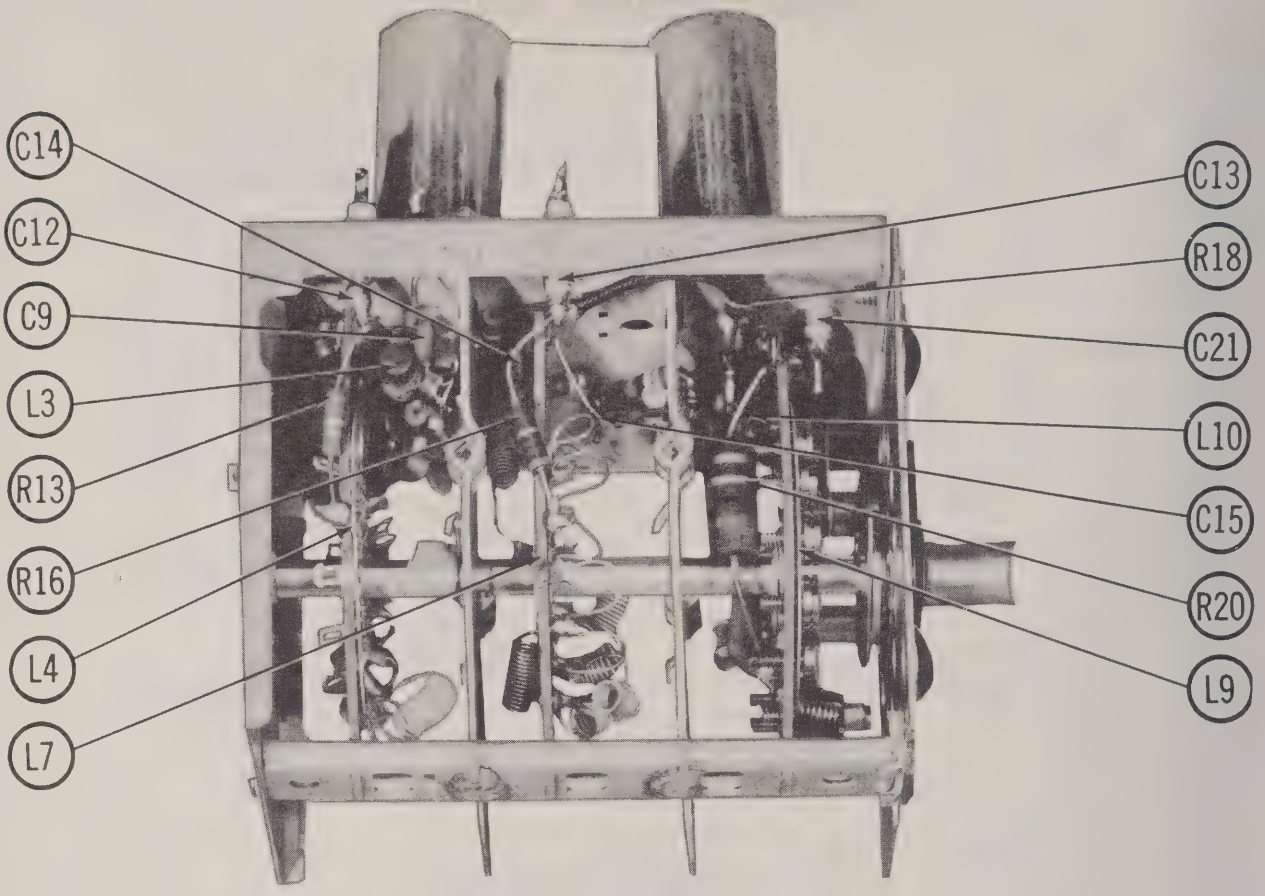
LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - V3, V4, V5, Diode (M5), V6
No pic, no sound, has snow - V1, V2, V3
No pic, has sound, has raster - V6, V15
Has pic, no sound - V6, V8, V9
Overloaded picture - V7

SYNC FAILURE
No vert. sync - V7
No horiz. sync - V7, Diode (M3)
No vert. or horiz. sync - V7

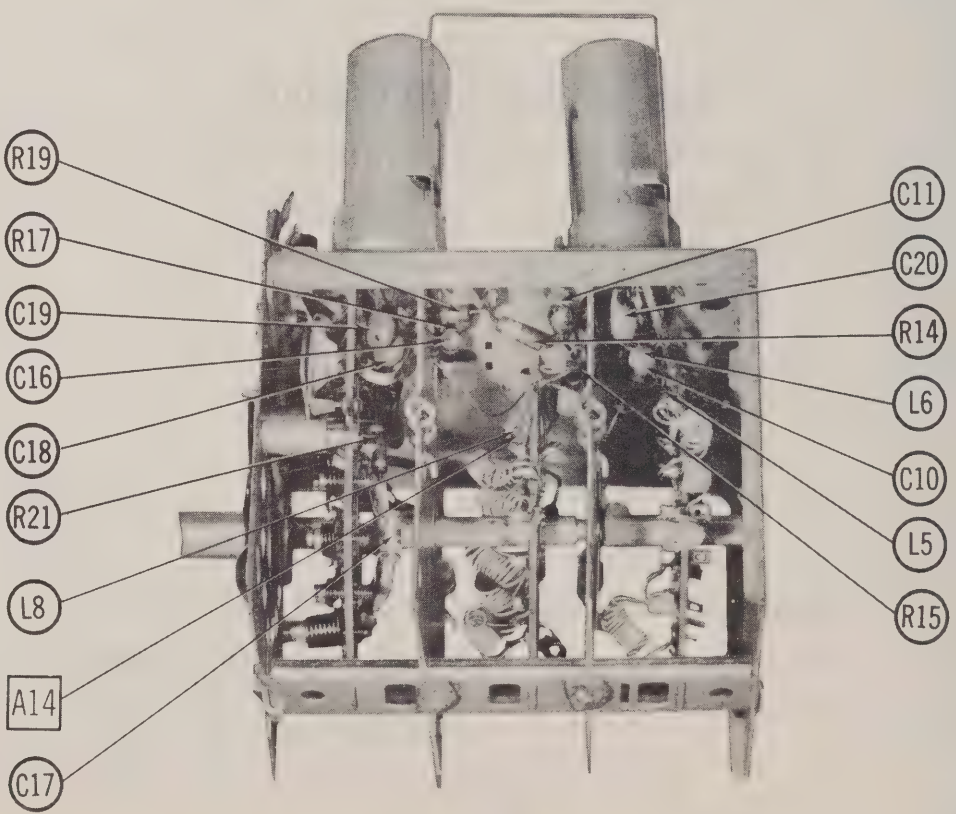
SWEEP FAILURE
No raster, has sound - Fuse (M4), M3, V11, V12, V13, V14, V15
No vertical deflection - V10
Poor vert. linearity or foldover - V10
Poor horiz. linearity or foldover - V11, V12, V13
Narrow picture - V11, V12, V13, M1, M2
Vert. off freq. - V10
Horiz. off freq. - V11

This receiver employs tubes used in a series filament network, an open filament in any tube in the series will cause the set to be inoperative. (See circuit below).

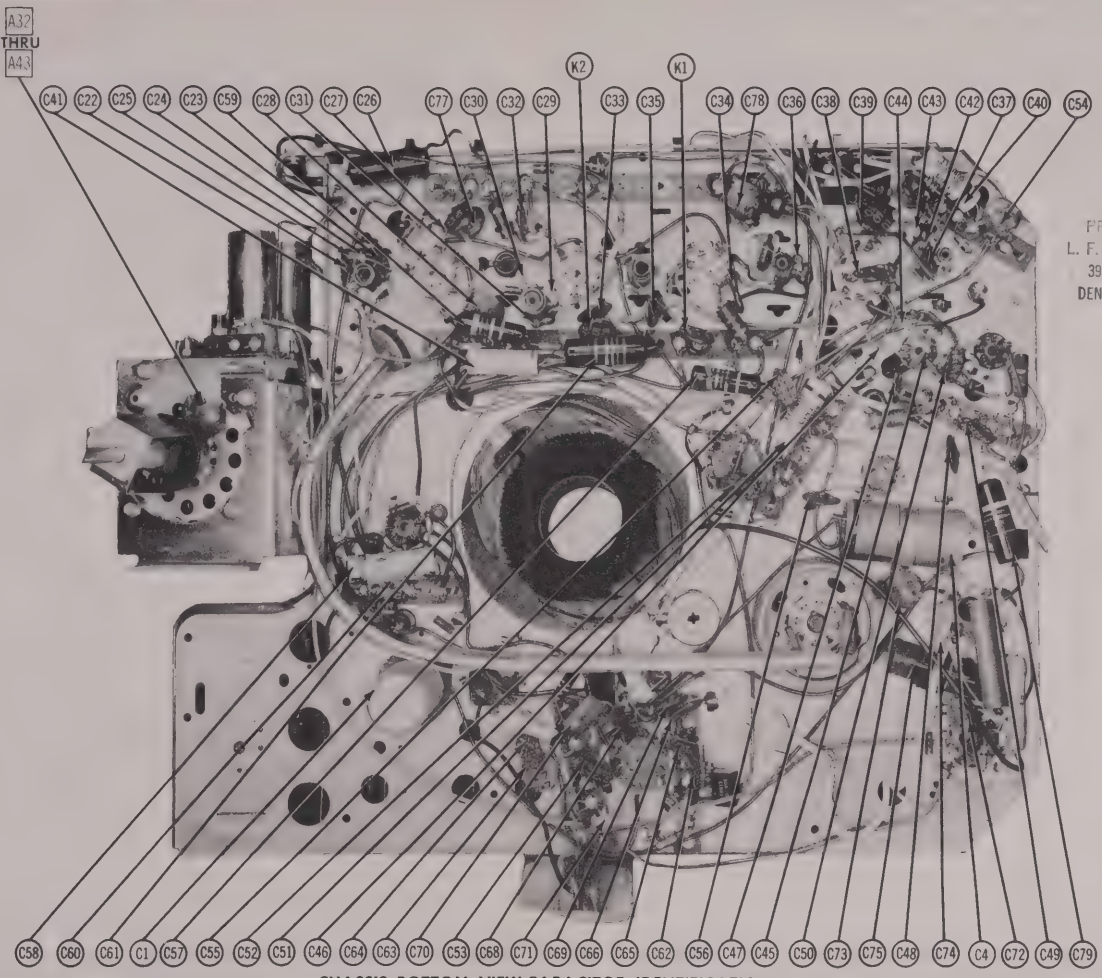




RF TUNER-LEFT SIDE



RF TUNER-RIGHT SIDE



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CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

ALIGNMENT INSTRUCTIONS

PRE-ALIGNMENT INSTRUCTIONS

Do not remove the horizontal oscillator tube (V11) to disable the high voltage.
The high voltage lead should be securely taped and kept away from the chassis.

SOUND IF ALIGNMENT

Connect an attenuator (Zenith #S-17203 or equivalent) in series with the antenna. Tune in a modulated TV signal and adjust the attenuator until the signal is below the limiting level of the 3BN6 (V8) as evidenced by a hiss in the sound similar to super-regeneration. Adjust A1, A2, A3 and A4 for maximum sound and best quality. Adjust the buzz control (R9) for MINIMUM buzz. If the hiss disappears during alignment, increase the attenuation until the hiss reappears.

VIDEO IF ALIGNMENT

Connect a short from pin 9 (grid) of V2 (5U8) to chassis.
Connect the negative lead of a 6 volt bias supply to point (A). Positive to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
Use only enough sweep generator output to provide a usable pattern on scope.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Fig. 1	High side thru network (Fig. 1) to point (B). Low side to chassis.	44.0MC (10MC Swp)	41.25MC 45.75MC	Any non-interfering channel	Vert. Amp. thru 10K to point (C). Low side to chassis.	A5, A6	Adjust for maximum gain and symmetry of response similar to Fig. 2 with markers as shown.
2.	"	High side to point (D). Low side to chassis.	"	41.25MC 42.75MC 45.0MC 45.75MC 47.25MC	"	"	A7, A8, A9, A10	Adjust for maximum gain and symmetry of response similar to Fig. 3 with markers as shown. A7 affects peak of curve, A8 affects low frequency side, and A9 and A10 affect the high frequency side.
3.	"	"	"	47.25MC	"	"	A11, A12	Switch scope to 10X gain used in steps 1 and 2. Adjust A11 and A12 for maximum attenuation at 47.25MC as in Fig. 4.
4.	"	"	"	40.5MC	"	"	A13	Switch scope gain back to where it was for steps 1 and 2. Remove the bias supply and short point (A) to chassis. Adjust A13 for maximum displacement of response curve at 40.5MC marker as in Fig. 5. DO NOT exceed the displacement of the 41.25MC marker.

VHF RF AND MIXER ALIGNMENT

Connect the negative lead of a 2 volt bias supply to point (F). Positive to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
Use only enough sweep generator output to provide a usable pattern on scope.
Use 10MC sweep unless otherwise noted.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
5.	50Ω to 300Ω Matching Trans.	Across antenna terminals thru matching transformer.	213MC	211.25MC 215.75MC	13	Vert. Amp. thru 10K to point (E). Low side to chassis.	A14	Adjust for maximum gain and symmetry of response similar to Fig. 6 with markers as shown. Adjust by expanding or compressing coil turns.
6.	"	"	207MC	205.25MC 209.75MC	12	"	A15	Check for response curve similar to Fig. 6. If necessary, adjust by bending loop in or out from switch rotor for proper response.
7.	"	"	201MC	199.25MC 203.75MC	11	"	A16	"
8.	"	"	195MC	193.25MC 197.75MC	10	"	A17	"
9.	"	"	189MC	187.25MC 191.75MC	9	"	A18	"
10.	"	"	183MC	181.25MC 185.75MC	8	"	A19	"
11.	"	"	177MC	175.25MC 179.75MC	7	"	A20	"
12.	"	"	85MC	83.25MC 87.75MC	6	"	A21, A22, A23	Adjust by expanding or compressing coil turns for response similar to Fig. 6.
13.	"	"	79MC	77.25MC 81.75MC	5	"	A24, A25	"
14.	"	"	69MC	67.25MC 71.75MC	4	"	A26, A27	"
15.	"	"	63MC	61.25MC 65.75MC	3	"	A28, A29	"
16.	"	"	57MC	55.25MC 59.75MC	2	"	A30, A31	"

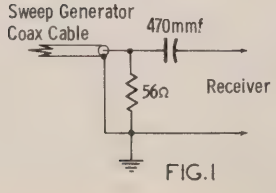


FIG.1

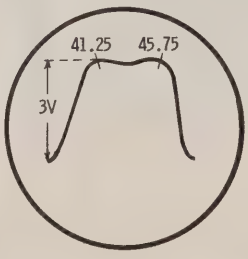


FIG.2

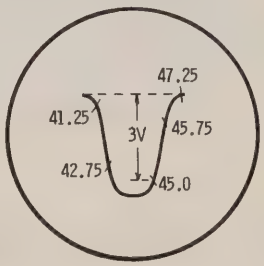


FIG. 3

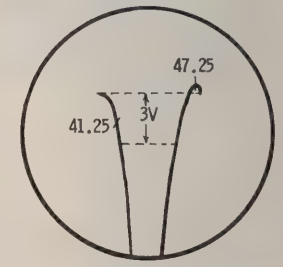


FIG. 4

ALIGNMENT INSTRUCTIONS (cont)

VHF OSCILLATOR ALIGNMENT

Connect bias as under "Video IF Alignment".
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
Set the fine tuning to the center of its range.
Use only enough sweep generator output to provide a usable pattern on scope.
Use 10MC sweep unless otherwise noted.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
17.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	213MC	211.25MC 215.75MC	13	Vert. Amp. thru 10K to point Ⓒ. Low side to chassis.	A32	Adjust to place sound marker in trap notch as in Fig. 7. Video marker should fall at 50%.
			207MC	205.25MC 209.75MC	12		A33	
			201MC	199.25MC 203.75MC	11		A34	
			195MC	193.25MC 197.75MC	10		A35	
			189MC	187.25MC 191.75MC	9		A36	
			183MC	181.25MC 185.75MC	8		A37	
			177MC	175.25MC 179.75MC	7		A38	
			85MC	83.25MC 87.75MC	6		A39	
			79MC	77.25MC 81.75MC	5		A40	
			69MC	67.25MC 71.75MC	4		A41	
			63MC	61.25MC 65.75MC	3		A42	
			57MC	55.25MC 59.75MC	2		A43	

UHF TUNER ALIGNMENT

Alignment of the UHF tuner should not be attemped without the proper test equipment.
Connect the negative lead of a 2 volt bias supply to point Ⓐ. Positive to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
Use only enough sweep generator output to provide a usable pattern on scope.
Use 10MC sweep unless otherwise noted.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
18.	Fig. 8	Across UHF antenna terminals thru matching network (Fig. 8).	713MC	711.25MC	54	Vert. Amp. thru 10K to point Ⓒ. Low side to chassis.	A44, A45, A46	With the UHF tuning knob set to channel 54, the rocker arm on the tuner should be in the horizontal position. If necessary, loosen the set screw and turn the shaft independently of the pulley until the arm is in the horizontal position with the channel indicator on channel 54. Tighten the set screw. If the calibration is off more than 3 channels, adjust A44 to place the video marker at 50% on the curve as in Fig. 9. The image (weaker response) will appear also. The response toward counter clockwise position of A44 is the proper response. Adjust A45 and A46 for maximum amplitude of response similar to Fig. 9.
19.	"	"	473MC	471.25MC	14	"		Check for response similar to Fig. 9. If the oscillator is off more than 3 channels, adjust the oscillator travel adjustment (osc., mixer and antenna travel adjustments are the 3 hex nuts on top of the UHF tuner next to tuner chassis) to scale. Care must be used when making this adjustment so as not to move the rocker arm out of its bearing. Set the mixer and antenna travel adjustments for maximum response on the scope.
20.	"	"	887MC	885.25MC	83	"	A47, A48, A49	Adjust A47 to place marker at 50% on curve similar to Fig. 9. Adjust A48 and A49 for maximum amplitude and symmetry.

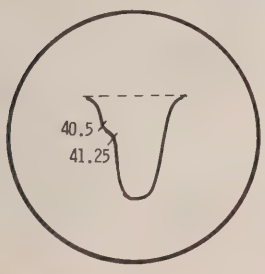


FIG. 5

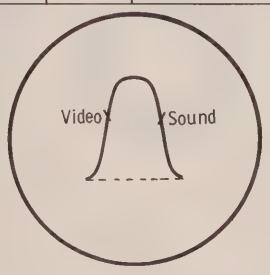


FIG. 6

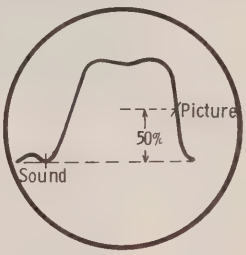


FIG. 7

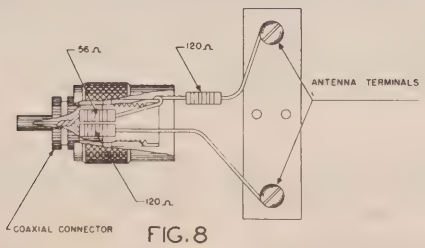


FIG. 8

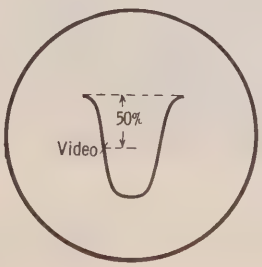
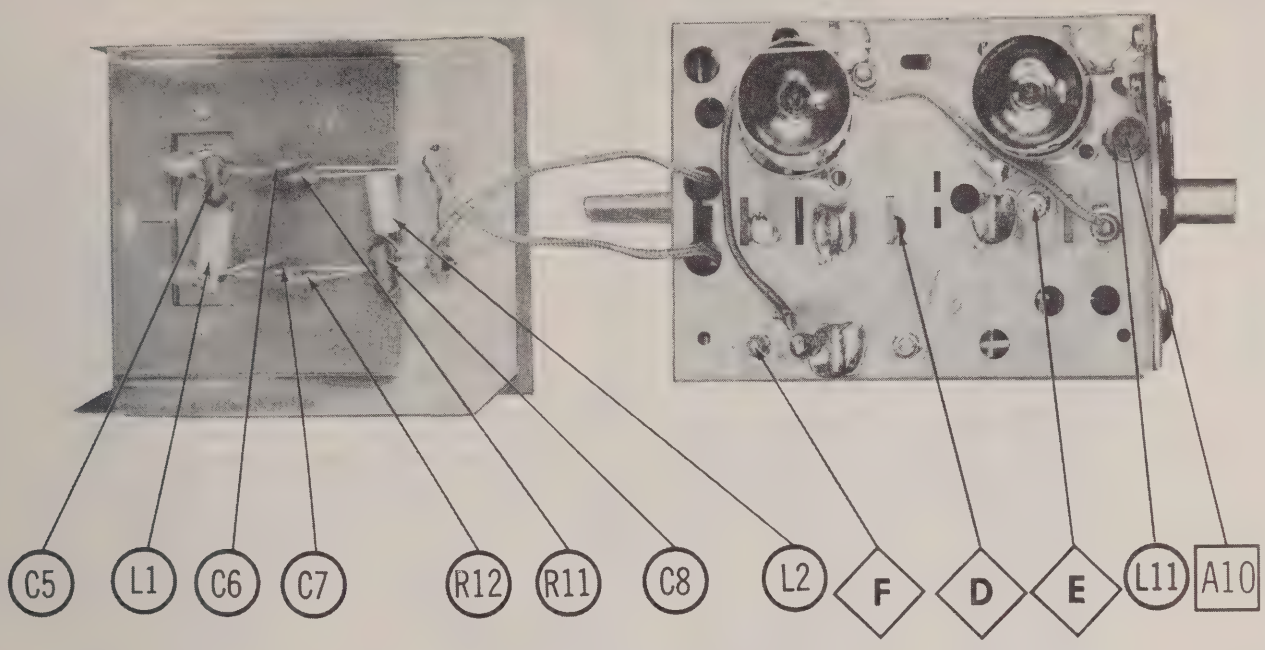
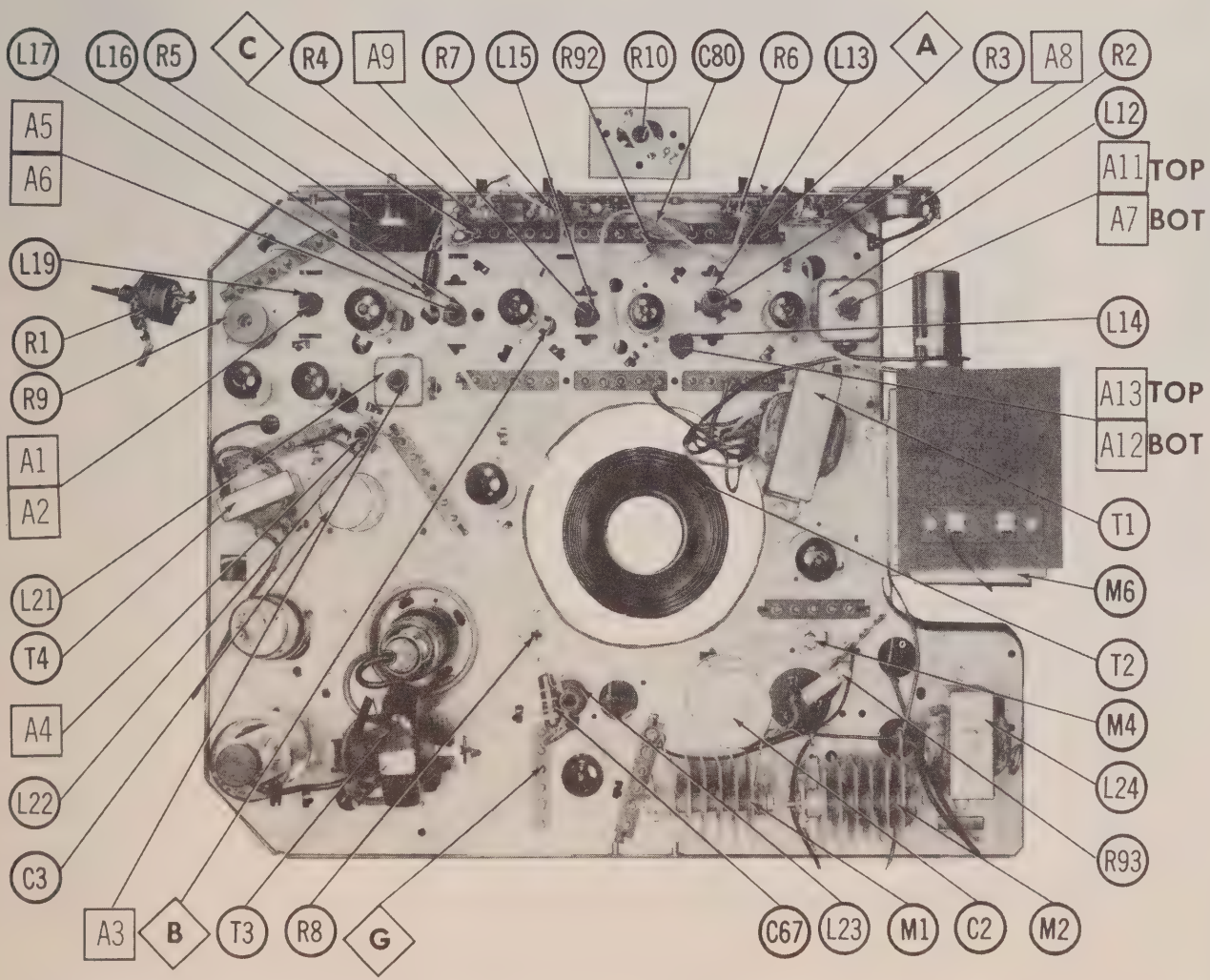


FIG. 9



RF TUNER-TOP VIEW

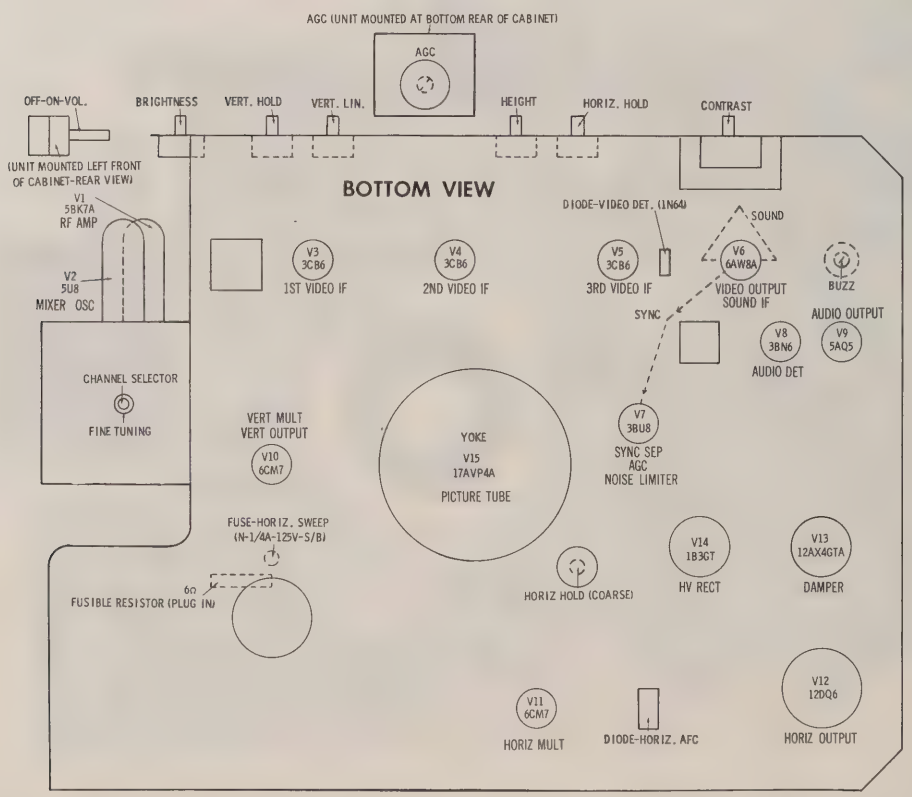


CHASSIS TOP VIEW

RESISTANCE MEASUREMENTS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	5BK7A	†1200Ω	55K	INF	2Ω	1Ω	INF	2Meg	0Ω	0Ω
V2	5U8	†10K	100K	†100K	0Ω	1Ω	†0Ω	0Ω	0Ω	10K
V3	3CB6	1.5Meg	56Ω	4.5Ω	3.5Ω	▲ 1000Ω	▲ 1000Ω	0Ω		
V4	3CB6	▲ 3300Ω	▲ 2.6Ω	4.5Ω	5.5Ω	†1000Ω	†1000Ω	†60K		
V5	3CB6	.1Ω	120Ω	6.5Ω	5.5Ω	†5600Ω	†5600Ω	0Ω		
V6	6AW8	0Ω	100K	†32K	8Ω	6.5Ω	56Ω	4700Ω	†15K	†8000Ω
V7	3BU8	0Ω	†20K	†70K	11Ω	10Ω	3.3Meg	†2.2Meg	1.6Meg	440K
V8	3BN6	● 300Ω	.4Ω	10Ω	9Ω	†22K	4.8Ω	†390K		
V9	5AQ5	0Ω	680Ω	9Ω	8Ω	†1100Ω	†470Ω	0Ω		
V10	6CM7	‡9700Ω	TP	0Ω	12.5Ω	11Ω	● ‡3.8Meg	● 380K	2.2Meg	● 1700Ω
V11	6CM7	‡140K	NC	560Ω	12.5Ω	14Ω	†27K	7.8Meg	● 140K	560Ω
V12	12DQ6	TP	16.5Ω	TP	†8300Ω	420K	TP	20Ω	0Ω	TOP CAP ‡16Ω
V13	12AX4	TP	NC	¶	NC	†0Ω	NC	16.5Ω	14Ω	
V14	1B3GT		PINS	1 THRU 8	HAVE	INFINITE	RESISTANCE			TOP CAP ‡296Ω
V15	17AVP4A	2Ω	● 24K	PIN 6 ‡260K	PIN 10 ‡260K	PIN 11 ● 140K	PIN 12 3.5Ω			

▲ MEASURED FROM PIN 7 OF V4.
† MEASURED FROM 235V SOURCE.
‡ MEASURED FROM PIN 3 OF V13.
● THIS READING WILL VARY. CONTROL SET FOR NORMAL OPERATION.
¶ THIS READING CAN VARY GREATLY, (10K MINIMUM), DUE TO THE CONDITION OF THE ELECTROLYTIC CAPACITOR CONNECTED IN THE ASSOCIATED CIRCUIT.
NC NO CONNECTION
TP TIE POINT



TUBE PLACEMENT CHART

L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

ZENITH MODELS Z1812RZ, Z1812RZU
(Ch. 15Z30, 15Z30U)

FOLDER 4

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No	USE	TYPE	NOTES
V1	RF Amplifier	3DK7A	
V2	Mixer/Oscillator	3LF6	
V3	1st Video IF Amp	3LD6	
V4	2nd Video IF Amp	3CB6	
V5	3rd Video IF Amp	3CB6	
V6	Video Output-Sound IF Amp	6AW8A	
V7	Auto. Noise Limiter-Sync Separator	3BU8	

ITEM No	USE	TYPE	NOTES
V8	Audio Det	3BN6	
V9	Audio Output	5AQ5	
V10	Vert. Mult - Vert Output	6CM7	
V11	Horiz. Mult	6CM7	
V12	Horiz. Output	12DQ6	
V13	Damper	12AX4GTA	
V14	HV Rectifier	1B3GT	

PICTURE TUBE

ITEM No.	REPLACEMENT DATA			NOTES
	ZENITH PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	
V15	17AVP4A		17AVP4A ①	1. Silver screen 65
		17AVP4A	17AVP4A ②	2. Aluminized
		17AVP4A ②	17AVP4A ①	
		17AV P4	17AVP4	
			17ATP4	
			17AVP4	

ELECTROLYTIC CAPACITORS

ITEM No	RATING		REPLACEMENT DATA							
	CAP	VOLT	ZENITH PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.	NOTES
C2	140	150	23-3749	AFH5U-S3	KA2H5	FPIJY	TMH-34	D-086	TVL-1438	
C3A	40	200	23-3741	AFH3-S0-S3	COT34.3	FP336.7		T-115 MTD-4540	R3300 *	
B	20	300								
C	20	50								
C3A	45	250	23-3744	AFH3-180	BOG30 DBG35	FP336 FP337	TMT-118	T-810	R3418 *	
B	30	400								
C	20	25								
C4	10	450	23-3570 ①		HP-PR5400 V10	BR2045, BR2048	TC75 TC75 †	TD-20-450, TD-20-450 †	MT-4520 , MT-4520 †	R3286 *

① Non-polarized unit.
† Constant negative leads together
* Non-catalog item.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							
	CAP.	VOLT	ZENITH PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C5	15		23-3679		TCS-15	C10Q15C	TCO-15			NPO 2.5%
C6	15	1000	23-3680							5%
C7	15	1000	23-3680							5%
C8	15		23-3679		TCS-15	C10Q15C	TCO-15			NPO 2.5%
C9	6.2		23-3561	HPG-51 S 6.2		C10Y5C	TCO-6.2			NPO 5%
C10	1.0		23-3453							
C11	1000		23-3569	EF-001	MPT-1000				503C-D1	
C12	1000		23-3569	EF-001	MPT-1000				503C-D1	
C13	1000		23-3569	EF-001	MPT-1000				503C-D1	
C14	30		23-3671	NT50-S1 30	TCN-35	C10Q30U	TCT-35			NT50 10%
C15	1000		23-3569	EF-001	MPT-1000				503C-D1	
C16	1.0		23-3720	HPG-S1 1.0	TCS-1		TCO-1		STCCB-V1	
C17	1.0		23-3704							N1500
C18	5		23-3716							N330
C19	5		23-3716							N330
C20	800		23-3331	BPD-0008	DS-801	L10T8	ED-0008		SGA-T8	
C21	1000		23-3569	EF-001	MPT-1000				503C-D1	
C22	17									NP0 10%
C23	470	1000	23-6	HVD-15-470	DD-471	BYA10T47	HDS5-470	DC30347	SGA-T47	
C24	3.1									
C25	8.0		23-3481			C10Y5C				
C26	15	200	23-3247	P26SN-15		CUR2P15		GEM-3025	2TM-P15	
C27	10000		23-3	BPD-01	DD-103	BYA501	ED-01	DC501	5HK-51	
C28	470		23-16		DS-471	L10T47	ED-470			10%
C29	.68		23-1786		TCS-68		TCO-68			
C30	7		23-3513			C10Y7C				NP0
C31	10									10%
C32 A	1000		23-31				ED-1000			10%
B	1000						ED-1000			10%
C33	470		23-16		DS-471	L10T47	ED-470			10%
C34	330		23-3567	1469-00053	DS-331	5RS733	ED-330		MS-333	10%
C35	1000	1000	23-17				ED-1000			10%
C36	6.7		23-3567	NT50-S1 5	TCN-5	C10Y5U	TCT-5	MT-555	STCUB-V5	N750
C37	47		23-3467							N75 5%
C38	3300		23-31	BPD-0033	DD-332	BYA10T33	ED-0033	UC-3323	SGA-G33	
C39	3300		23-3	BPD-01	DD-103	BYA501	ED-01	DC501	5HK-51	
C40	.1	200	23-1777	P26SN-1		DF-104		GEM-201	2TM-P1	
C41	.047	200	23-1778	P26SN-047		DF-503	CUB2S47	GEM-4147	2TM-S47	
C42	3.3		23-3343	HPG-S1 3.3	TCS-3R3	C10Y3C	TCC-3.3	ET-5533	STCCB-V3.3	
C43	80		23-3480	S1 50	D6-500	L7E2S	GP-50	UC-545	SGA-Q5	
C44	3.6		23-3596							5%
C45	7.5		23-3742							
C46	10		23-2731							N150 5%
C47A	1000		23-31				ED-1000			10%
B	1000						ED-1000			10%
C48	470	1000	23-6	HVD-15-470	DD-471	BYA10T47	HDS5-470	DC30347	SGA-T47	
C49	10000		23-3	BPD-01	DD-103	BYA501	ED-01	DC501	5HK-51	
C50	3300		23-3	BPD-0033	DD-333	BYA10D33	ED-0033	UC-3323	SGA-G33	
C51	.1	200	23-1777	P26SN-1		DF-104	CUB2P1	GEM-201	2TM-P1	
C52	100		23-3		DD-101	L10T1	ED-100	DC501	5HK-51	10%
C53	10000		23-3	BPD-01	DD-103	BYA501	ED-01	DC501	5HK-51	
C54	470	1000	23-6	HVD-15-470	DD-471	BYA10T47	HDS5-470	DC30347	SGA-T47	
C55	3300		23-31	BPD-0033	DD-332	BYA10D33	ED-0033	UC-3323	SGA-G33	
C56	10000		23-3	BPD-01	DD-103	BYA501	ED-01	DC501	5HK-51	
C57	.033	600	23-3635							10%
C58	.1	400	23-3308	P46SN-1		DF-104		GEM-401	4TM-P1	
C59	.0047	600	23-1549							10%
C60	.01	200	23-3565							10%
C61	.033	600	23-3235							10%
C62A	51		23-35	S1 51		TCS-51	L10Q51	ED-51	UC-545	SGA-Q5
B	51			S1 51		TCS-51	L10Q51	ED-51	UC-545	SGA-Q5
C63	1000	1000	23-17				ED-1000			10%
C64	1000		23-34							10%
C65	470	1000	23-6		HVD-15-470	DD-471	BYA10T47	HDS5-470	DC30347	SGA-T47
C66	4700		23-16							10%
C67	.0033	400	23-3664							10%
C68	330		23-3567	1469-00033		5RS733			MS-333	10%
C69	100		23-3		DD-101	L10T1	ED-100			10%

PARTS LIST AND DESCRIPTIONS

CAPACITORS (cont)

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	ZENITH PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C70	680		23-3565	1464-00068		1R5T68			3GS-368	10%
C71	680		23-3569				ED-680			10%
C72	4700		23-16							10%
C73	10000		23-3	BPD-01	DD-103	BYA501	ED-01	DC501	5HK-51	
C74	100	4000	23-3594							10%
C75	.15	400	23-3261	P46SN-15		CUB4P15		GEM-4115	4TM-P15	
C76	56	3000			DC30-560	BYA10Q56		DC30456		
C77	470	1000	23-6	HVD-15-470	D6-471	BYA10T47	HDS5-470	DC30347	SGA-T47	
C78	470	1000	23-6	HVD-15-470	D6-471	BYA10T47	HDS5-470	DC30347	SGA-T47	
C79	.047	600	23-3564		P46SN-047	DF-503	CUB4S47	GEM-4147	4TM-S47	
C80	10000	1400	23-3653		DAC-27		CUB1S63		GEM-1611	BL-810

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	ZENITH PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No	
R1A	1Meg	½	53-3618	AB-S9	A47-1Meg-B	Q11-137	U54	Volume
B	Shaft			AK-7	FS-3	Not Req.	Not Req.	
C	Switch			KS-1	SWK-12	TS-1	126-26	
R2A	500K	½	53-3264	B-S1		Q17-133	TA55R	Brightness
B	Shaft			Not Req.		Not Req.	Not Req.	
R3A	750K	½	53-3263	B-S6	A47-750K-B	Q11-136	PTA754L	Vert. Hold
B	Shaft			Not Req.	KS8-3	Not Req.	Not Req.	
R4A	25K	½	53-3698	B-S5	A47-25K-B	Q11-130	TA25S1	Horiz Hold
B	Shaft			Not Req.	KS8-3	Not Req.	Not Req.	
R5A	7000Ω	2(WW)	53-3609	WW-T52	A45-7000	WP2T000	R7000L	Contrast
B	Shaft			Not Req.	KS8-3	Not Req.	Not Req.	
R6A	3500Ω	½	53-3266	AB-9	A47-4000-B	Q11-116	PTA355L	Vert. Lin.
B	Shaft			AK-19	KN-3	TQ	Not Req.	
R7A	7.5Meg	½	53-3263	AB-S9 *	A47-7.5Meg-B *	Q11-143 *	PTA855L *	Height with 1Meg stop
						TQ	Not Req.	
B	Shaft			AK-19	RN-3			
R8A	200K	½	53-3697	BK-46	A47-200K-B	B11-139	TA254L	Horiz. Hold (Coarse)
B	Shaft			Not Req.	FS3-1/4	Not Req.	Not Req.	
R9	750Ω	2(WW)	53-3284		S9-800-50		FL-750 †	Buzz with 100Ω stop
R10	750Ω	2	53-3283				PTA754L	AGC - Note 1

Note 1. Alternate part #53-3969 may be used in some versions.
* Use 1Meg resistor in series with right hand terminal.
† Use a 100Ω resistor in series with terminal

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	ZENITH PART No.	IRC PART No.	
R11	270K		53-3807	BTS-270K	
R12	220K		53-3807	BTS-220K	
R13	120K		53-1841	BTS-22K	
R14	180K		53-1875	BTS-180K	
R15	100K		53-1869	BTS-100K	
R16	1000Ω			BTS-1000	
R17	100K		53-1869	BTS-100K	
R18	100K		53-1869	BTS-100K	
R19	10K		53-1827	BTS-10K	
R20	10K	2		BTS-10K	
R21	4700Ω		53-1813	BTS-4700	
R22	470K		53-1898	BTS-470K	
R23	180K		53-1875	BTS-180K	
R24	1Meg		53-1911	BTS-1Meg	
R25	1.5Meg		53-1923	BTS-1.5Meg	
R26	220K		53-1863		
R27	10K		53-1828		
R28	1000Ω		53-1795	BTS-1000	
R29	56Ω		53-1723	BTS-56	
R30	180K		53-1875		
R31	1000Ω		53-1795	BTS-1000	
R32	120K		53-1873	BTS-120K	
R33	2350Ω	2	53-1907	BTS-2350	
R34	5600Ω	2	53-3223	BTS-5600	
R35	130Ω		53-1747	BTS-130	
R36	4700Ω		53-1823	BTS-4700	
R37	47K		53-1855		
R38	39K		53-1852		
R39	56K		53-1853		
R40	1000Ω		53-1795	BTS-1800	
R41	470K		53-1898		
R42	18K	2	53-3264	BTS-18K	Note 1
R43	4700Ω		53-1813	BTS-4700	
R44	56Ω		53-1723	BTS-56	
R45	390K		53-1894	BTS-390K	
R46	470K		53-1898	BTS-470	
R47	100K		53-1870	BTS-100K	Note 2
R48	100K		53-1870	BTS-100K	
R49	10K			BTS-10K	
R50	680Ω		53-1779	BTS-680	
R51	390K		53-1894	BTS-390K	
R52	22K	2	53-1856	BTS-22K	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	ZENITH PART No.	IRC PART No.	
R53	470Ω		53-1751	BTS-470	
R54	680Ω	1	53-3230	BTA-680	
R55	3.3Meg		53-1935	BTS-3 2Meg	
R56	3.3Meg		53-1933	BTS-3 3Meg	
R57	1.2Meg		53-1915	BTS-1 2Meg	
R58	3.3Meg		53-1933	BTS-3 3Meg	
R59	180K		53-1880	BTS-180K	
R60	100K		53-1869	BTS-100K	
R61	220K		53-1883	BTS-220K	
R62	270K		53-1887	BTS-270K	
R63	3.3Meg		53-1933	BTS-3 3Meg	
R64	22K		53-1841	BTS-22K	
R65	330K		53-1890	BTS-330K	
R66	8300Ω	4	53-3602	PW4-8200	
R67	82K		53-1866	BTS-82K	
R68	100K		53-1869	BTS-100K	
R69	220Ω		53-1758	BTS-220	
R70	2.5Meg		53-1925	BTS-2 5Meg	
R71	22K		53-1841	BTS-22K	
R72	1000Ω	1	53-998	BTA-1000	
R73	390Ω				
R74	330Ω				
R75	330K		53-1890	BTS-330K	
R76	330K		53-1890	BTS-330K	
R77	3300Ω		53-1799	BTS-3300	
R78	1.5Meg		53-1918	BTS-1 5Meg	
R79	5.6Meg		53-1943	BTS 5 6Meg	
R80	27K	1	53-1183	BTA-27K	
R81	47K		53-1885	BTS-47K	
R82	470K		53-1898		
R83	180K	1	53-3213	BTA-180K	
R84	560Ω		53-1776	BTS-560 1%	Note 3
R85	15K			BTS-15K	
R86	100Ω		53-1744	BTS-100	
R87	1Meg		53-1913	BTS-1Meg	
R88	150K		53-1880	BTS-180K	
R89	100Ω		53-1744	BTS-100	
R90	3200Ω	4	53-3603	PW4-8200	
R91	22K	1	53-3055	BTA-22K	
R92	230K		53-3807	BTS-220K	
R93	8Ω	5	53-3544		
R94	61Ω	25	53-3699		

Note 1. Some versions use a 15K in this application.
Note 2. Some versions use a 220K in this application.
Note 3. Some versions use a 510Ω, 5% in this application.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA						NOTES
		ZENITH PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thorderson PART No.	Triad PART No.
T1	Vert. Output	95-1555	Z1607 ①	A-3824 ①	V315 ①	VO-101 ②	26576	A-12X ①
T2A	Yoke-Horiz.(53MH)	95-1452 ③	DY-60 ④ 3 4 5	MDY-H ④ 4 5	YW3712/47 ④ 4 5	DY-53A ④ 4 5	Y-33 ④ 5 7	Y-40 ④ NW2 ⑤
B	(90°) Vert. (41MH)							
T3	Horiz. Output	53-40134		HVO-143	X137 *	HO-271 *	FLY-118 *	

① Cut and tape blanking lead.
② Drill new mounting hole(s).
③ Includes capacitor C78.
④ Use original horizontal damping network, if necessary.
⑤ Cut and form a piece of .010 gauge flat paper inside the yoke itself, and support with an acetate cement to provide an insulation between the width sleeve and the yoke proper.
⑥ Connect horizontal network across terminals #3 and #7.
⑦ Connect horizontal network across terminals #2 and #6. Connect yoke terminal #2 to horizontal output terminal #2, yoke terminal #7 to horizontal output terminal #1.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

	ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thorderson Replacement Connections	Triad Replacement Connections
	4			4	4	4		
	3		3	3	3	2	2	
	2		2	2	2	3		
	1			1	1	1		
Special Rotor →				B	B	B		

B Install 3.3Ω ② ½W resistor in series with filament lead

TRANSFORMER (AUDIO OUTPUT)

ITEM No	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI	SEC	ZENITH PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thorderson PART No.	Triad PART No.	
T4	10 TK	3-4Ω	95-1428	Z1127 ①	A-3993 ①	A-3880 ①	26852 ①	S-11X	① Drill new mounting hole.

SPEAKER

ITEM No	TYPE				REPLACEMENT DATA		NOTES
	SIZE	FIELD	V C	IMP	ZENITH PART No.	QUAM PART No.	
SP1	4"	PM		3-4Ω	42-512	4A1	

COILS (RF-IF)

ITEM No.	USE	ZENITH PART No.	NOTES
L1	IF Trap Coil	30-567	
L3	IF Trap Coil	30-567	
L2	Ant. Trans.	8-34644	Alternate part #6-34645
L4	Ant. Coils	8-33641	Complete wafer assembly
L5	Ant. Coil	30-600	Channel 13
L6	Mext. Coil	30-623	

ITEM No.	USE	ZENITH PART No.	NOTES
L7	RF Coils	8-33640	Complete wafer assembly Channel 13
L8	RF Coil	30-665	Channels 2 - 13
L9	Osc. Coils	8-33639	
L10	Mixer Screen Coil	30-632	
L11	Mixer Plate Coil	8-34177	

ITEM No.	USE	REPLACEMENT DATA				NOTES
		ZENITH PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L12	1st. Video IF	8-42369				Includes 47.25MC trap & assy. - Note 1
L13	2nd. Video IF	8-42398		TV-130 *	6130 *	
L14A	40.5MC Trap	45-6395				
B	47.25MC Trap					
L15	3rd. Video IF	8-33940		17-4533 *	6219 *	
L16	4th. Video IF	8-40394		TV-130 *	6219 *	Note 3
L17	Resonant Choke	8-33466				33 Microhenries
L18	Shunt Peaking Coil	8-38018	18-3300	TV-130	6133	330 Microhenries
L19A	4.5MC Trap	8-40818		TV-130		Note 3
B	1st. Sound IF					
L20	Series Peaking Coil	8-30880	18-3155 ▲	TV-131 *	6153 ▲	137 Microhenries, wound on 1K resistor
L21	2nd. Sound IF	8-33548				
L22	Quadrature Coil	8-19030	30-1005 *	TV-131 *	1480 *	

* Drill new mounting hole.
▲ Parallel with 18K resistor.
Note 1. Alternate part #6-34775.
Note 2. Alternate part #6-33940.
Note 3. Alternate part #6-33850.

TRANSFORMER (HORIZ. OSC.)

ITEM No.	DC RES.		REPLACEMENT DATA							NOTES
	PRI.	SEC.	ZENITH PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	RCA TYPE No.	Ram PART No.	Thorderson PART No.	
L23	100Ω		8-33343	18-1576	TV-133	6310		S-103	HS-5	20-40 Millihenries

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA						
	TOTAL DIRECT CURRENT	D.C. RESISTANCE	INDUCTANCE @ CURRENT 1000 ℃	ZENITH PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thorderson PART No.	Triad PART No.	NOTES
L24	.260A	63Ω	1.2 Hy.	96-1538	C5030 ①	C-3991 ①	C-2327	26C41	C-32X ①	

① Drill one new mounting hole.

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	ZENITH PART No	REPLACEMENT DATA
K1	Vert. Integrator		97-5	
K3	Vert. Integrator		97-4	

RECTIFIERS

ITEM No.	RATING		REPLACEMENT DATA					NOTES
	CURRENT (Measured)		ZENITH PART No.	FEDERAL PART No.	GENERAL ELECTRIC PART No.	INTERNATIONAL PART No.	SARKES TARZIAN PART No.	
M1	.250A		22-14 ①	1326A ①	1N1007 ②	MR300 ①	100 ①	① Selenium type.
M2	.250A		22-14 ①	1326A ①	1N1007 ②	MR300 ①	300 ①	② Germanium type
M3			103-90 ①	1315 ① ③		TT1 ① ③		③ 2 Required.

PARTS LIST AND DESCRIPTIONS (Continued)

FUSES

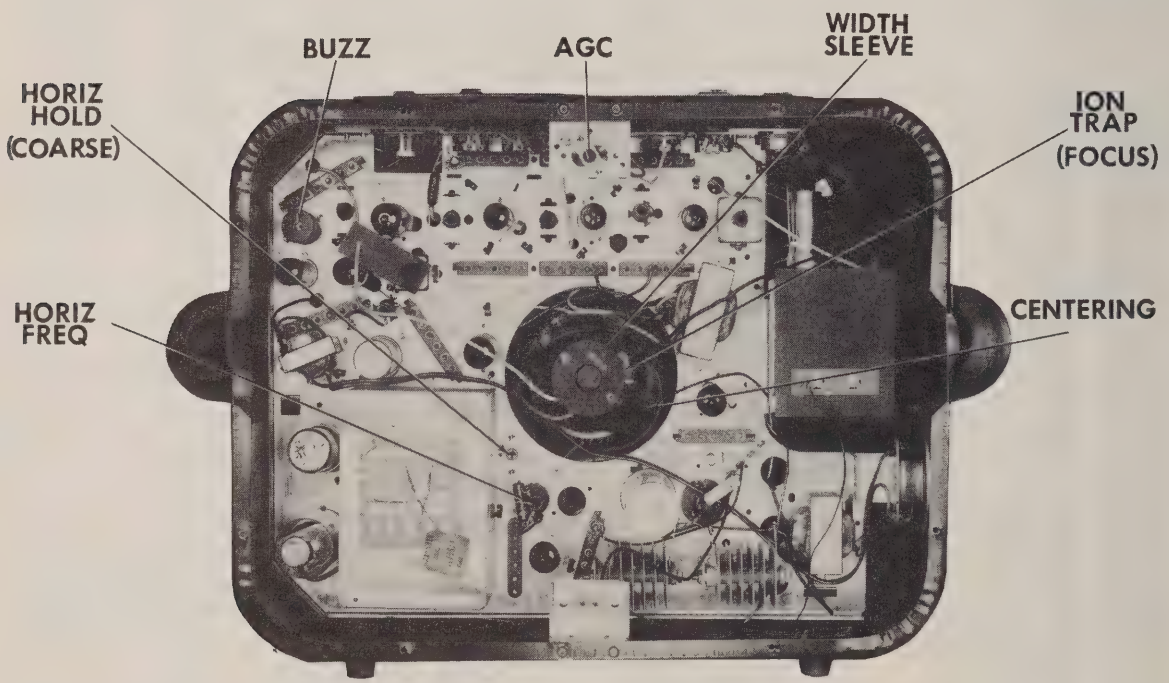
ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			ZENITH PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M4	N	1/4A 125V S/B	136-33	62-18	333.250 (N 1/4A 125V S/B)	346008	N 1/4	HC 0 to 3/10

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA			NOTES
		ZENITH PART No.	CBS PART No.	SYLVANIA PART No.	
M5	1N64A	103-18	1N64	1N64	Video Detector (Pigtail)

MISCELLANEOUS

ITEM No.	PART NAME	ZENITH PART No.	NOTES
M6	Tuner	S-24662	VHF - Chassis 15Z30
	Tuner	S-24663	VHF - Chassis 15Z30U
	Tuner	S-41362	UHF - Chassis 15Z30U
M7	Width Sleeve		
M8	Centering Device	S-22560	Includes yoke clamp
M9	Ion Trap	S-22574	



CABINET—REAR VIEW

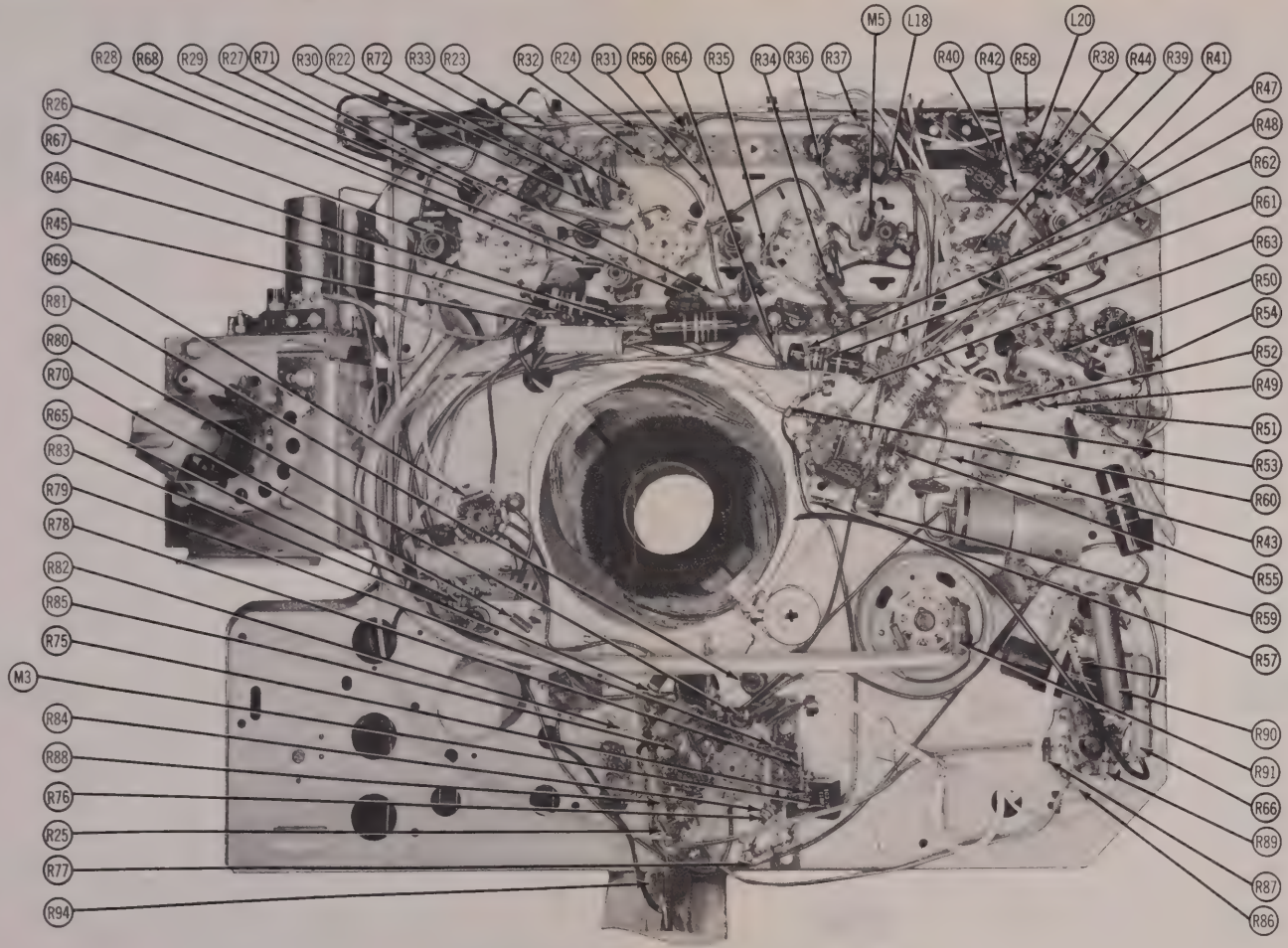
HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

1. Connect a clip lead from point Ⓖ to chassis. Connect another short clip lead across the horizontal frequency coil (L23). Set the horizontal hold control to the center of its range.

2. Tune in a TV station and adjust the coarse horizontal hold control until the picture is as nearly in sync as possible.

3. Remove the clip lead from L23 and adjust the horizontal frequency slug (B1) until the picture is as nearly in sync as possible.

4. Remove the clip lead from point Ⓖ to chassis. If necessary to insure positive synchronization, retouch the coarse horizontal hold control.



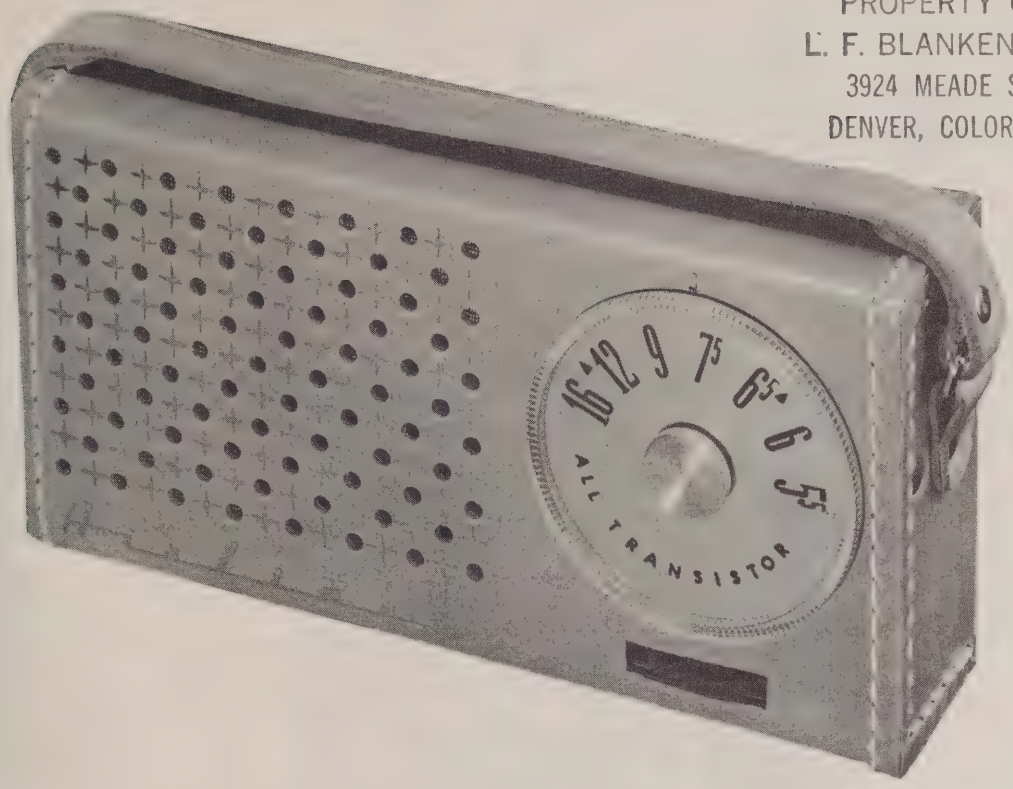
CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

PHOTOFACT* Folder

AIRLINE
MODEL GTM-1108A

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

AIRLINE
MODEL GTM-1108A



AIRLINE
MODEL GTM-1108A

TRADE NAME	Airline Model GTM-1108A
SUPPLIER	Montgomery Ward & Co., 619 Chicago Ave., Chicago, Illinois
TYPE SET	Battery Operated Portable AM Transistorized Receiver
POWER SUPPLY	9 Volts DC
RATING	17MA @ 9 Volts DC
TUNING RANGE—BROADCAST	540KC to 1600KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Remove speaker bracket assembly to perform step 1.
Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.		Loop	455KC (400~ Mod)	Tuning gang fully open	Across voice coil	A1, A2, A3	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
2.		"	1625KC	Tune to 1625KC signal	"	A4	"
3.		"	1400KC	Tune to 1400KC signal	"	A5	"
4.		"	600KC	Tune to 600KC	"	A6	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output. Repeat steps 2 & 3. Check receiver frequency range to insure reception of full broadcast band.

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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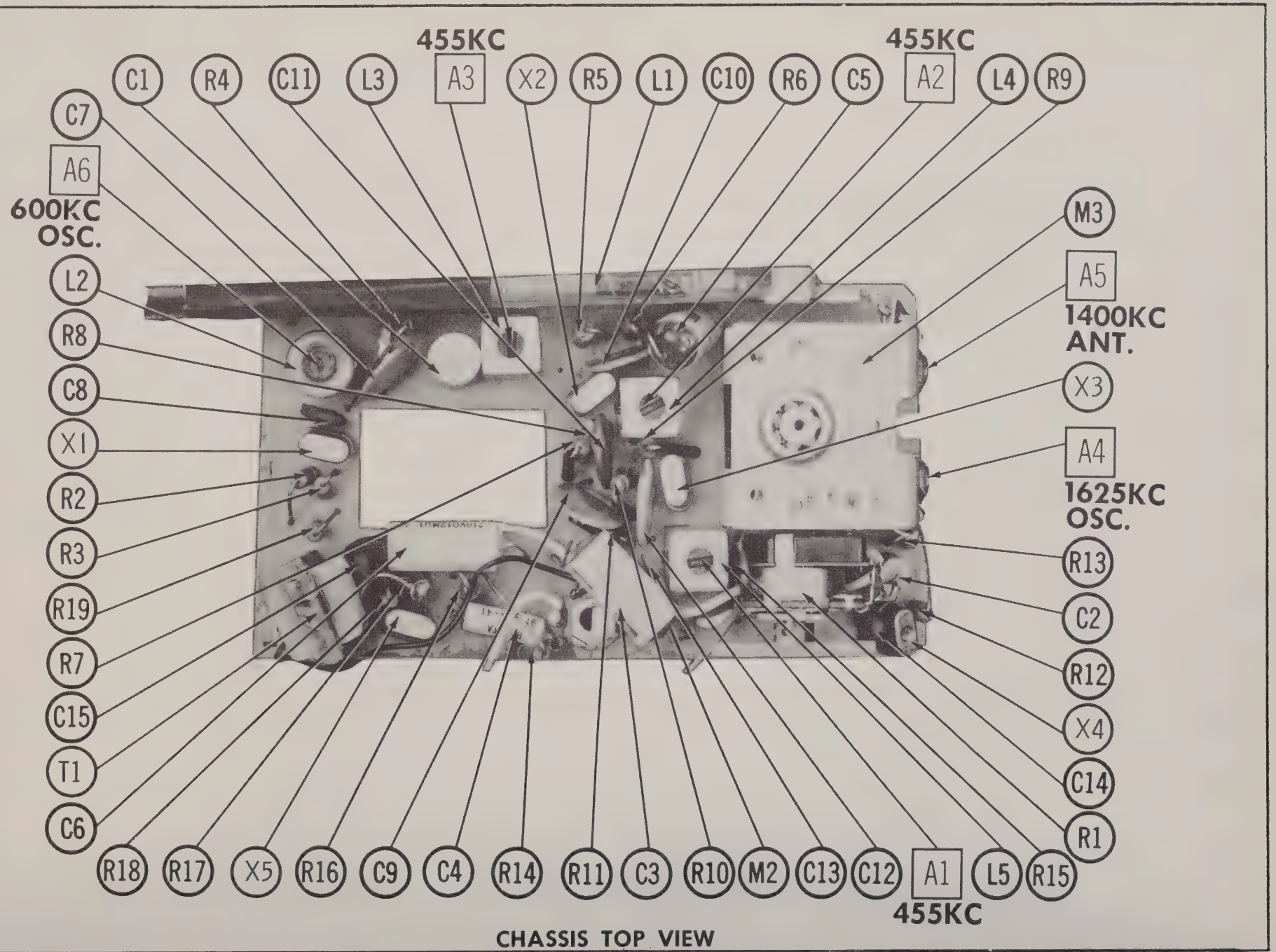


CHASSIS TOP VIEW

PARTS LIST AND DESCRIPTIONS

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA			NOTES
			CBS PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
X1	2N252	Converter		2N415		
X2	2N253	1st IF Amplifier				
X3	2N254	2nd IF Amplifier				
X4	2N238	Driver		2N362		
X5	2N291	Output		2N360		

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	AIRLINE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1	10	3	218V012M11	XPP3010	NL10-3	TT3X10	ML10-6		TE-1053
C2	5	12	218V012M09	XPP12005	NL5-15	TT12X5	ML5-15		TE-1127
C3	40	10	218V012M01	XPP12040	NL50-10	TT10X50	ML40-15		R2329 *
C4	5	12	218V012M09	XPP12005	NL5-15	TT12X5	ML5-15		TE-1127
C5	40	12	218V012M01	XPP12040	NL50-10	TT10X50	ML40-15		R2329 *
C6	40	10	218V012M01	XPP12040	NL50-10	TT10X50	ML40-15		R2329 *

* Non Catalog Item

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	AIRLINE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C7	4700			BPD-0047	DD-472	BYA10D47	ED-0047	UC-5247	5GA-D47	
C8	1000		215V300M15	BPD-001	DD-102	BYA6D1	ED-1000	DC521	5HK-D1	
C9	10000		215V300M11	BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C10	10000		215V300M12	BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C11	2200			BPD-0022	DD-222	BYA10D22	ED-0022	UC-5222	5GA-D22	
C12	50000		215V303M03						TG-S50	
C13	20000		215V303M04						TG-S20	
C14	1000		215V300M15	BPD-001	DD-102	BYA6D1	ED-1000	DC521	5HK-D1	
C15	1000		215V300M15	BPD-001	DD-102	BYA6D1	ED-1000	DC521	5HK-D1	

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	AIRLINE PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1	5000Ω	½	270V024M01					Volume & Switch

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	AIRLINE PART No.	IRC PART No.	
R2	39K			BTS-39K	
R3	8200Ω			BTS-8200	
R4	4700Ω			BTS-4700	
R5	56K			BTS-56K	
R6	1000Ω			BTS-1000	
R7	100Ω			BTS-100	
R8	1000Ω			BTS-1000	
R9	15K			BTS-15K	
R10	470Ω			BTS-470	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	AIRLINE PART No.	IRC PART No.	
R11	1500Ω			BTS-1500	
R12	22K			BTS-22K	
R13	3300Ω			BTS-3300	
R14	2200Ω			BTS-2200	
R15	1000Ω			BTS-1000	
R16	12K			BTS-12K	
R17	1500Ω			BTS-1500	
R18	39Ω			BTS-39	
R19	470Ω			BTS-470	

PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	AIRLINE PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	510Ω	12Ω	430V034M01		A-2706		TR-19 ①		① Tape center tap on prim. and bend ears under.

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	AIRLINE PART No.	QUAM PART No.	
SP1	2 3/4"	PM	12Ω	570V004M01		

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA				NOTES
		AIRLINE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Loop Stick	310V012M02			2005	
L2	Osc. Coil	230V026M01			2022	
L3	1st IF	235V014M01			9-C1 ①	① Disregard Tap
L4	2nd IF	235V014M01			9-C1 ①	① Disregard Tap
L5	3rd IF	235V014M02			9-C2	

BATTERIES

ITEM No.	VOLTAGE	AIRLINE PART No.	REPLACEMENT DATA								NOTES
			BURGESS		EVEREADY		MALLORY		RAY-O-VAC		
			"A"	"B"	"A"	"B"	"A"	"B"	"A"	"B"	
M1	9V	62-96	P6		226		M1600		1600		

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA			NOTES
		AIRLINE PART No.	CBS PART No.	SYLVANIA PART No.	
M2	1N87G ①	296V002M01	1N60	1N60	Audio Detector

① Alternate Type 1N295

MISCELLANEOUS

ITEM No.	PART NAME	AIRLINE PART No.	NOTES
M3	Tuning Cap.	330V005M01	2 Gang (Ant. 23-135MMF, Osc. 30-95MMF)

CABINETS & CABINET PARTS

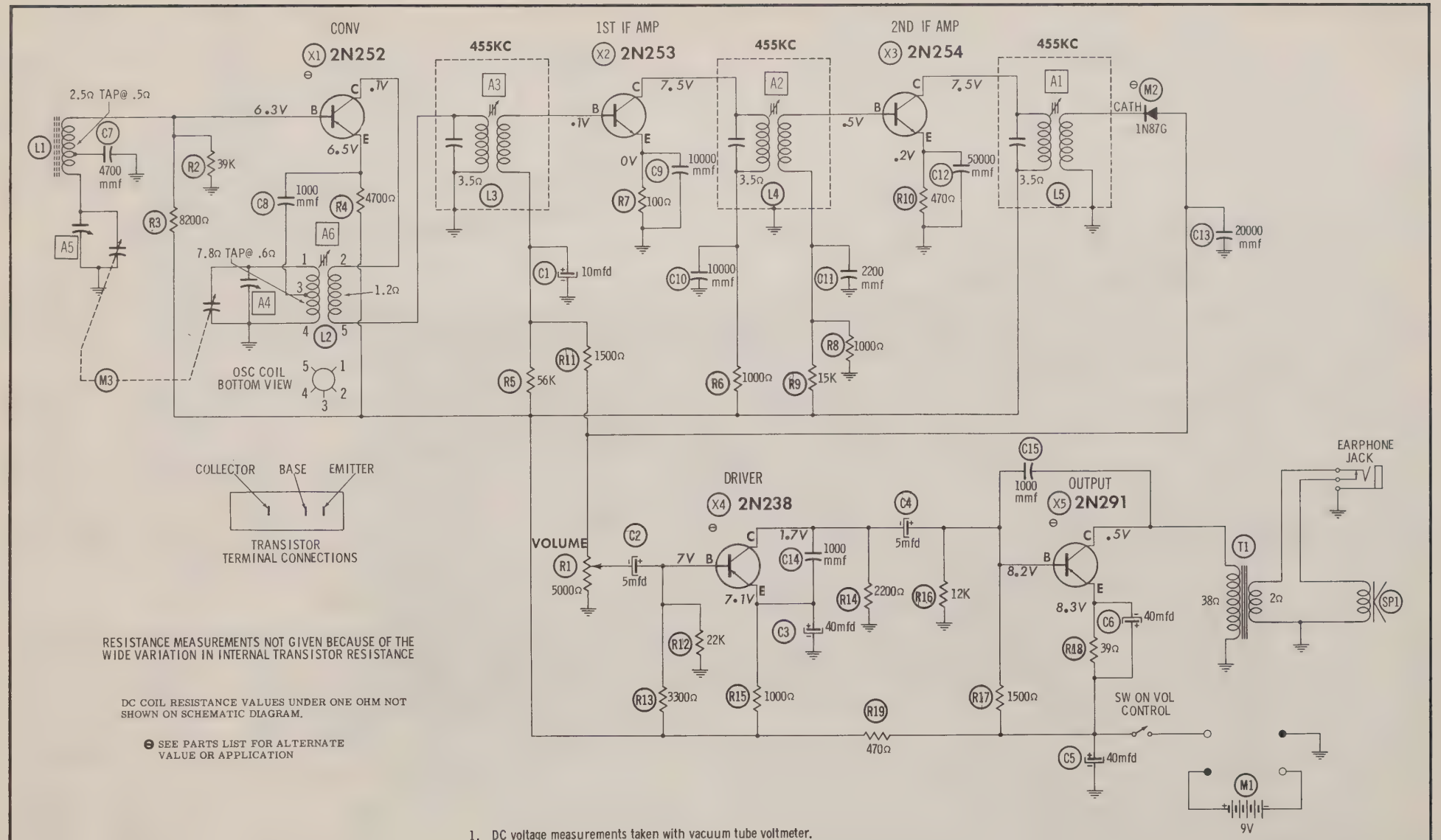
(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	550V033M02	Tuning
Knob	550V017M01	On-Off-Volume
Cabinet	513V014M01	
Screw	761V804M01	Dial Knob

DISASSEMBLY

1. Remove screw from center of tuning dial. Remove dial.
2. Open rear cover. Remove battery.
3. Remove screw located at tuning gang end of printed board.
4. With open side of radio up, grip printed board and slide it toward the tung gang end of the cabinet until speaker bracket is free of metal lip.
5. Raise end of printed board over metal lip and remove board from cabinet.

FOLDER 5



RESISTANCE MEASUREMENTS NOT GIVEN BECAUSE OF THE WIDE VARIATION IN INTERNAL TRANSISTOR RESISTANCE

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM.

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

1. DC voltage measurements taken with vacuum tube voltmeter.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to commom negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
Howard W. Sams & Co., Inc. 1957

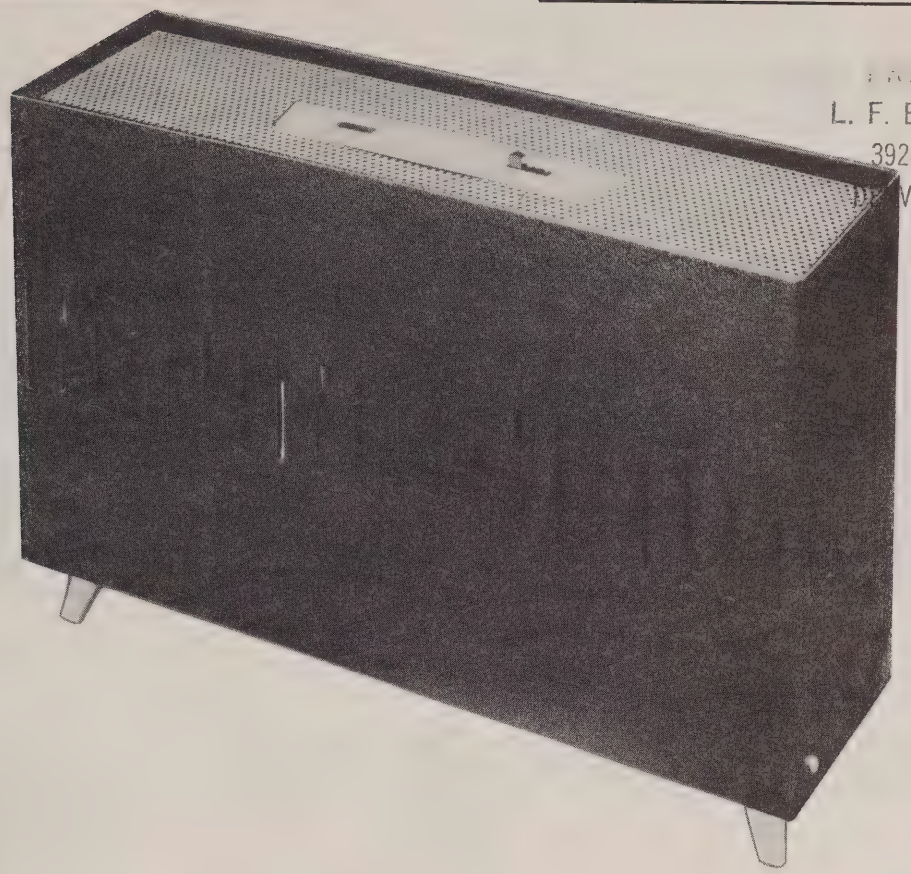
PHOTOFACT* Folder

*TRADE MARK

RETMA MEMBER RADIO-ELECTRONIC-TELEVISION MANUFACTURERS ASSOCIATION

DAVID BOGEN MODEL DO70

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO



DAVID BOGEN
MODEL DO70

DAVID BOGEN
MODEL DO70

TRADE NAME	David Bogen Model DO70
MANUFACTURER	David Bogen Co., Inc., P.O. Box 500, Paramus, N. J.
TYPE SET	AC Operated Audio Amplifier
TUBES (Six)	Types 6U8 AF Amp. - Phase Inv., (2) EL34/6CA7 Output, 12B4A Regulator, 6C4 Regulator Control, 5U4GB/GZ34 Rectifier
POWER SUPPLY	110-120 Volts AC - 60 Cycles RATING .85 Amp. @ 117 Volts AC (85 Watts)

VOLTAGE REGULATOR ADJUSTMENT (R4)

This control should be adjusted if V2, V3, V4 or V5 are replaced. Turn Voltage Regulator (R4) to minimum. Turn Level Adjust (R1) to minimum. Apply power to the set and allow a 4 minute warm-up period. Disconnect the two shorting bars from the "CUR MON" terminal strip. Connect a DC voltmeter from terminal 1 to terminal 2. (The voltmeter must be capable of accurately measuring 1 volt.) Adjust the Voltage Regulator (R4) for a SLIGHT needle deflection (.05 to .1 volt). Measure the voltage between terminal 2 and 3. Connect the meter to those terminals (1 & 2 or 2 & 3) which indicated the highest voltage. Adjust the Voltage Regulator (R4) until the meter indicates 1 volt. Reconnect the two shorting bars, 1 to 2 and 2 to 3.

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	AF Amp. - Phase Inv.	6U8	
V2	Output	EL34/6CA7	
V3	Output	EL34/6CA7	

ITEM No.	USE	TYPE	NOTES
V4	Regulator	12B4A	
V5	Regulator Cont.	6C4	
V6	Rectifier	5U4B/GZ34	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	David Bogen PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1	30	400	(Note 1)	PRS450V30	BR3045	TC77	TD-30-450	MT-4530	TVA-1711
C2	30	400	(Note 1)	PRS450V30	BR3045	TC77	TD-30-450	MT-4530	TVA-1711
C3	150	50		PRS50V150	BR1505	TC495	TD-150-50	MT-15150	TVA-1311
C4A	▲20	450		AFH2-69	B0500	FP434	TMD-61	D-270	TVL-2935
B	▲20	450							
C5	100	6		PRS6V100	BBR100-6	TC2501	TD-100-6	MTH-0610	TVA-1101
C6	5	200		PRS250V4	BBR4-250	TC50X	TD-4-450	MT-4504	TVA-1501

Note 1. C1 & C2 should be a matched pair.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

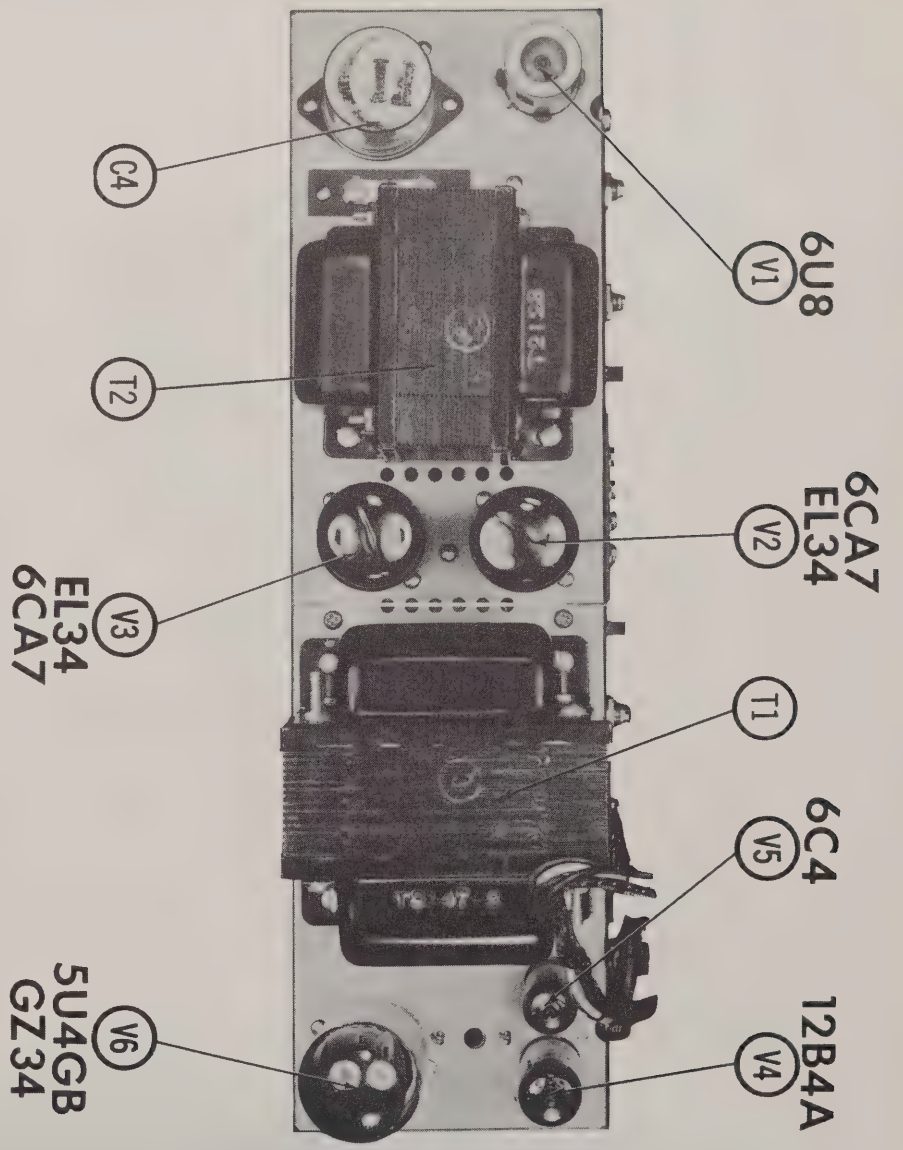
ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	David Bogen PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C7	4.7			NP0-SI 4.7	TCZ-4R7	C10V47C	TCO-4.7	ZT-5547	5TCCB-V47	
C8	.15	400		P488N-15		CUB4P15		GEM-4015	4TM-P15	①
C9	10000			BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C10	27				TCZ-27	C10Q27C	TCO-27			NP0
C11	39			N750-SI 39	TCN-39	C10Q39U	TC7-39			N750
C12	.22	400		P488N-22		CUB4P22		GEM-4022	4TM-P22	
C13	.22	400		P488N-22		CUB4P22		GEM-4022	4TM-P22	
C14	1800				DD-182	L10D18	GP-1800	UC-5218	5GA-D18	②
C15	4700			BPD-0047	DD-472	BYA10D47	ED-0047	UC-5247	5GA-D47	
C16	10000			BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C17	100			BPD-0001	DD-101	L10T1	ED-100	UC-531	5GA-T1	
C18	.1	600		P688N-1	DF-104	CUB6P1		GEM-601	6TM-P1	
C19	.047	600		BPD-05	DF-503	CUB6S47		GEM-6147	6TM-S47	

① Some versions may use .22MFD in this application.
② Not used in some versions.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESIST-ANCE	WATTS	David Bogen PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	100K	½	V391	AB-40	A47-100K-S			Level Adjust
B	Shaft			AK-1	FKS-1/4			
R2	100Ω	½	V388					Damping Factor
R3A	100K	½	V393A	AB-40	A47-100K-S	Q11-128	U41	Power Monitor Adjust
B	Shaft			AK-1	FKS-1/4	RQ	Not Req.	
C	Switch			KB-1	SWE-12	76-1	US-26	
R4	100K	½	V392A				TA15L	Voltage Regulator Adjust

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA David Bogen PART No.	REPLACEMENT DATA IRC PART No.	NOTES
R5	110K 5%			BTS-110K 5%	
R6	12K			BTS-12K	
R7	27K			BTS-27K	
R8	56K			BTS-56K	Note 1
R9	390K			BTS-390K	
R10	2200Ω			BTS-2200	
R11	820Ω			BTS-820	
R12	110K 5%			BTS-110K 5%	
R13	150K			BTS-150K	
R14	100K 5%			BTS-100K 5%	Note 2
R15	100K 5%			BTS-100K 5%	Note 2
R16	15K			BTS-15K	
R17	33Ω 5%			BTS-33 5%	
R18	33Ω 5%			BTS-33 5%	

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA David Bogen PART No.	REPLACEMENT DATA IRC PART No.	NOTES
R19	2.7Meg			BTS-2.7Meg	Note 3
R20	150Ω	7		PW7-150	
R21	18Ω	1		BTA-18	
R22	1Ω	2			
R23	.47Ω	1			
R24	12K			BTS-12K	
R25	390Ω			BTS-390	
R26	6.8Meg			BTS-6.8Meg	
R27	150K 5%			BTS-150K 5%	
R28	47K	2		BTB-47K	
R29	10Ω	2			
R30	47K	1		BTA-47K	
R31	470K				Note 4
R32	150K 5%			BTS-150K 5%	
R33	2.7Ω 5%				

Note 1. Some versions may use 39K Resistor.
Note 2. Some versions may use 110K 5% Resistor.
Note 3. Some versions may use 82K Resistor.
Note 4. Special low noise deposited Carbon Resistor.

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	RATING SEC. 3	REPLACEMENT DATA David Bogen PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC @ .85A	1000VCT @ .046A Tap @ 32V (Bias Tap)	5VAC @ 3A	6.3VCT @ 3.6A SEC. 4 6.3VAC @ .600A	T3147					

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA David Bogen PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T2	6500Ω CT	16Ω Tap @ 8Ω, 4Ω	T2123		A-3130	A-3801	22S68 ①		① Drill new mounting holes.

SELENIUM RECTIFIER

ITEM No.	RATING CURRENT (Measured)	REPLACEMENT DATA David Bogen PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	SARKES TARZIAN PART No.	NOTES
M1	.00005A	H373	1263A	RS065	50	

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA David Bogen PART No. FUSE	David Bogen PART No. HOLDER	LITTELFUSE PART No. FUSE	LITTELFUSE PART No. HOLDER	BUSS PART No. FUSE	BUSS PART No. HOLDER
M2	3AG	3A 125V S/B			313003. (3AG 3A 125V S/B)	342001	MDX3	HKP

MISCELLANEOUS

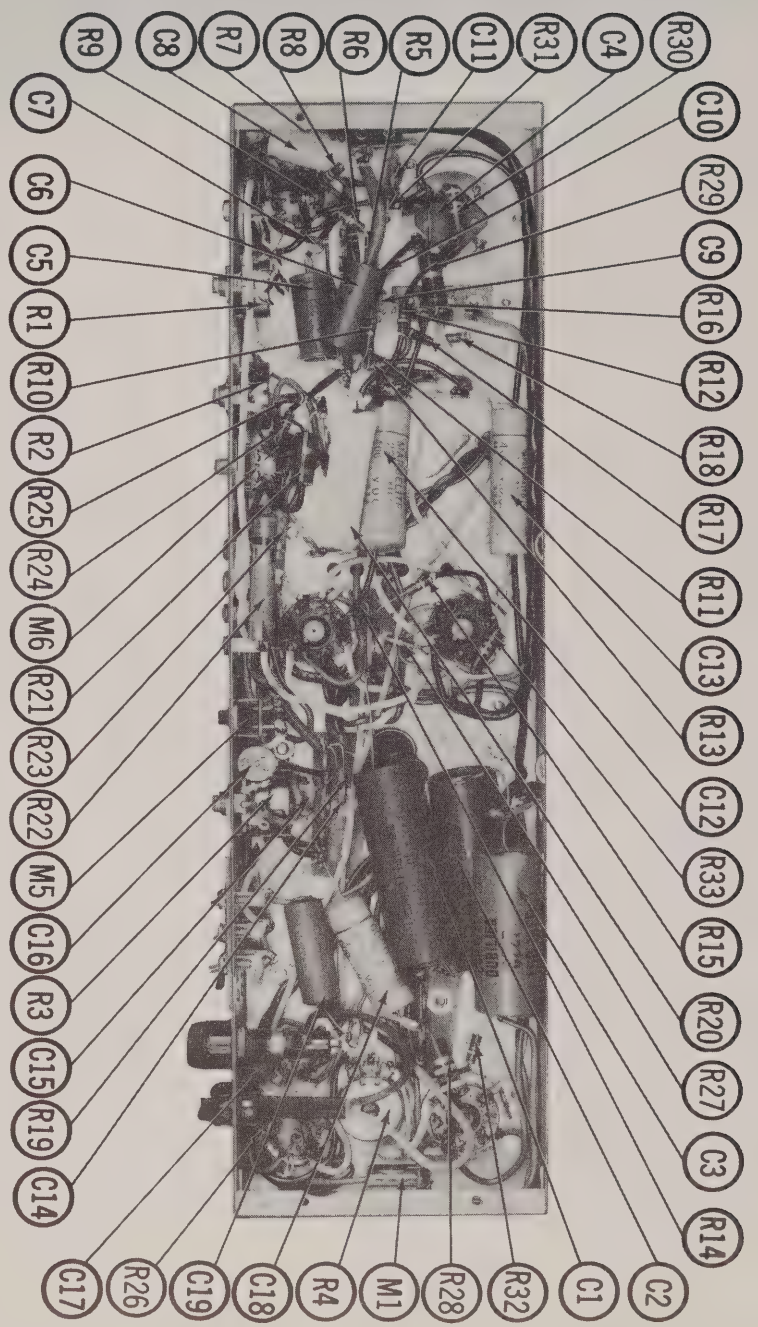
ITEM No.	PART NAME	David Bogen PART No.	NOTES
M3	Pilot Light		Power Monitor, NE-51 (Neon)
M4	Switch	S475	Speaker Selector (Slide Type DPDT)
M5	Switch	S381	Speaker Impedance Selector (Slide Type DPDT)
M6	Switch	S476	Damping Factor On-Off (Slide Type SPDT)

SET 379 FOLDER 6

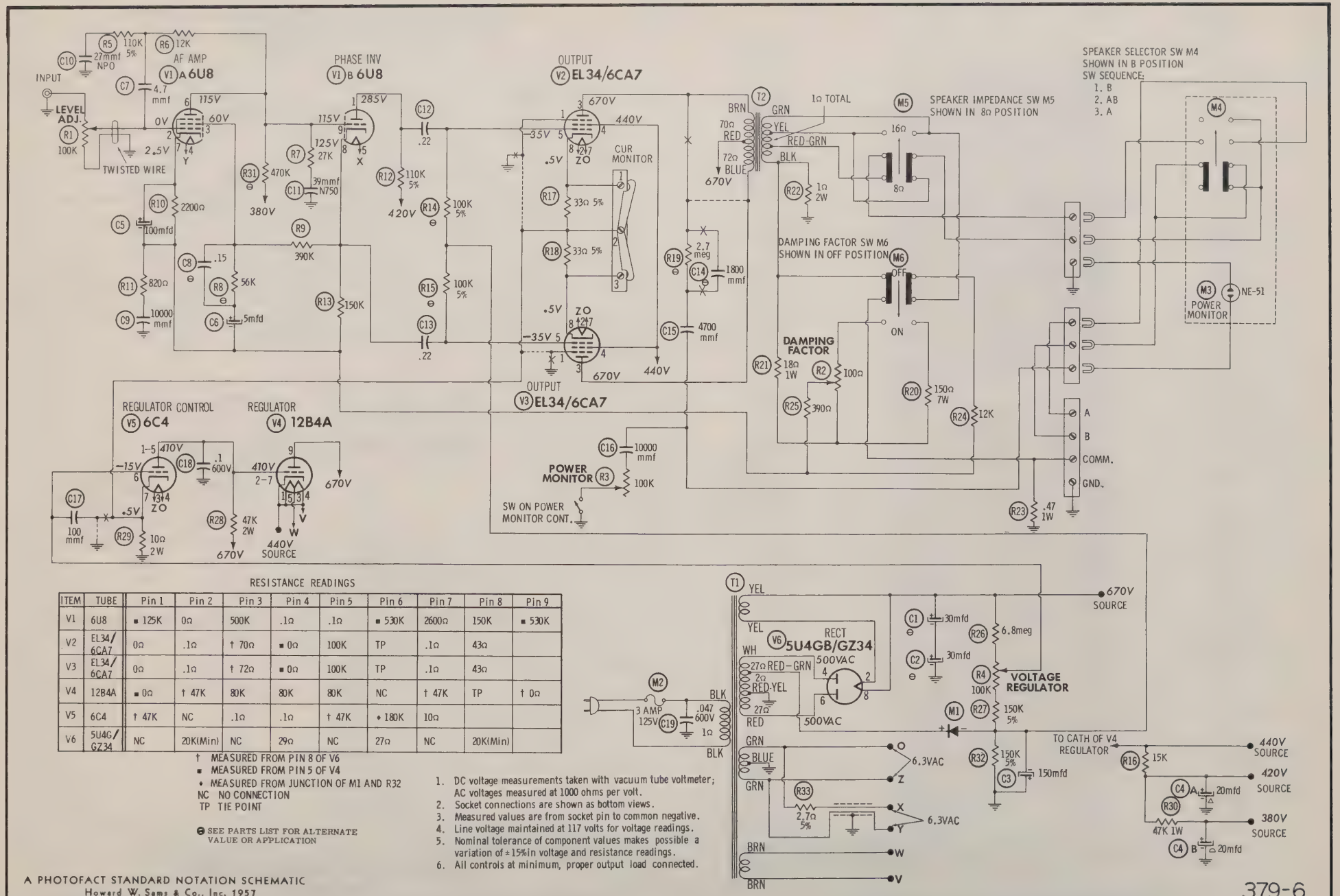
FOLDER 6

DAVID BOGEN MODEL DO70

CHASSIS—BOTTOM VIEW



DAVID BOGEN MODEL DO70



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6U8	▪ 125K	0Ω	500K	.1Ω	.1Ω	▪ 530K	2600Ω	150K	▪ 530K
V2	EL34/6CA7	0Ω	.1Ω	† 70Ω	▪ 0Ω	100K	TP	.1Ω	43Ω	
V3	EL34/6CA7	0Ω	.1Ω	† 72Ω	▪ 0Ω	100K	TP	.1Ω	43Ω	
V4	12B4A	▪ 0Ω	† 47K	80K	80K	80K	NC	† 47K	TP	† 0Ω
V5	6C4	† 47K	NC	.1Ω	.1Ω	† 47K	♦ 180K	10Ω		
V6	5U4G/GZ34	NC	20K(Min)	NC	29Ω	NC	27Ω	NC	20K(Min)	

† MEASURED FROM PIN 8 OF V6
▪ MEASURED FROM PIN 5 OF V4
♦ MEASURED FROM JUNCTION OF M1 AND R32
NC NO CONNECTION
TP TIE POINT

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance of component values makes possible a variation of ±15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
Howard W. Sams & Co., Inc. 1957

PHOTOFACT* Folder

*TRADE MARK

RETMA MEMBER

GROMMES MODEL 15PG

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

GROMMES MODEL 15PG

GROMMES MODEL 15PG

TRADE NAME	Grommes Model 15PG
MANUFACTURER	Precision Electronics, Inc., 9101 King Ave., Franklin Park, Illinois
TYPE SET	AC Operated 6 Channel 12 Watt Audio Amplifier
TUBES (Six)	Types 12AX7 Preamplifier, 12AX7 AF Amplifier, 12AX7 AF Amp.-Phase Inv., (2) 6V6GT Output, 5Y3GT Rectifier
POWER SUPPLY	110-120 Volts AC-50/60 Cycles RATING .63 Amp. @ 117 Volts AC (64 Watts)

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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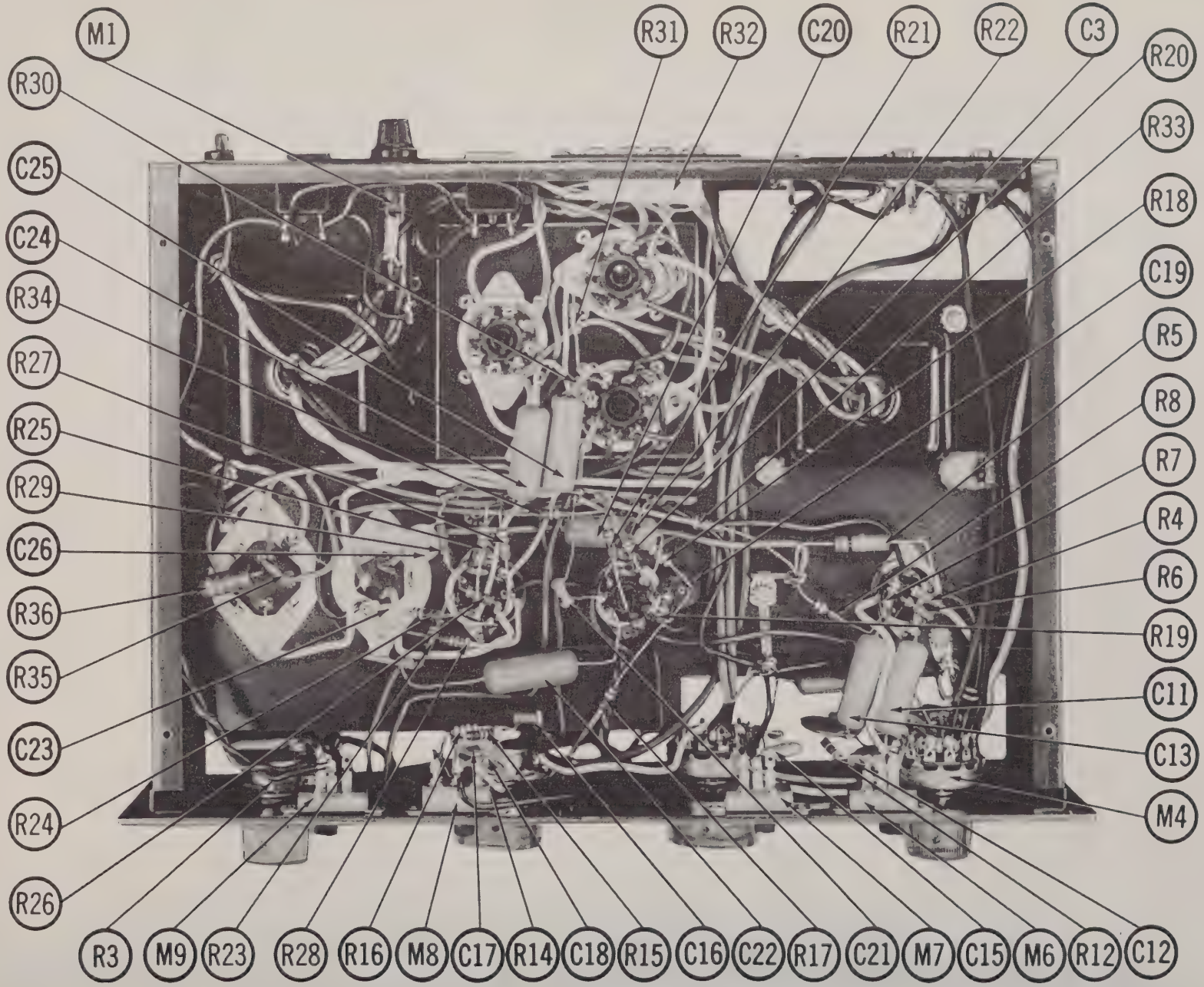


CHASSIS BOTTOM VIEW

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	Phono Preamplifier	12AX7	
V2	AF Amplifier	12AX7	
V3	AF Amp. - Phase Inv.	12AX7	

ITEM No.	USE	TYPE	NOTES
V4	Output	6V6GT	
V5	Output	6V6GT	
V6	Rectifier	5Y3GT	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	GROMMES PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	●40	400		AFH4-117-48		FP367.5		Q-250	
B	■30	350				TC62		MTD-4520	
C	▲10	300							
D	20	25							
C2A	■10	250		AFH3-86-90	B0200	FP231		T-378	
B	▲10	250			BBR100-15	TC2501		MT-02100	
C	100	15							

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

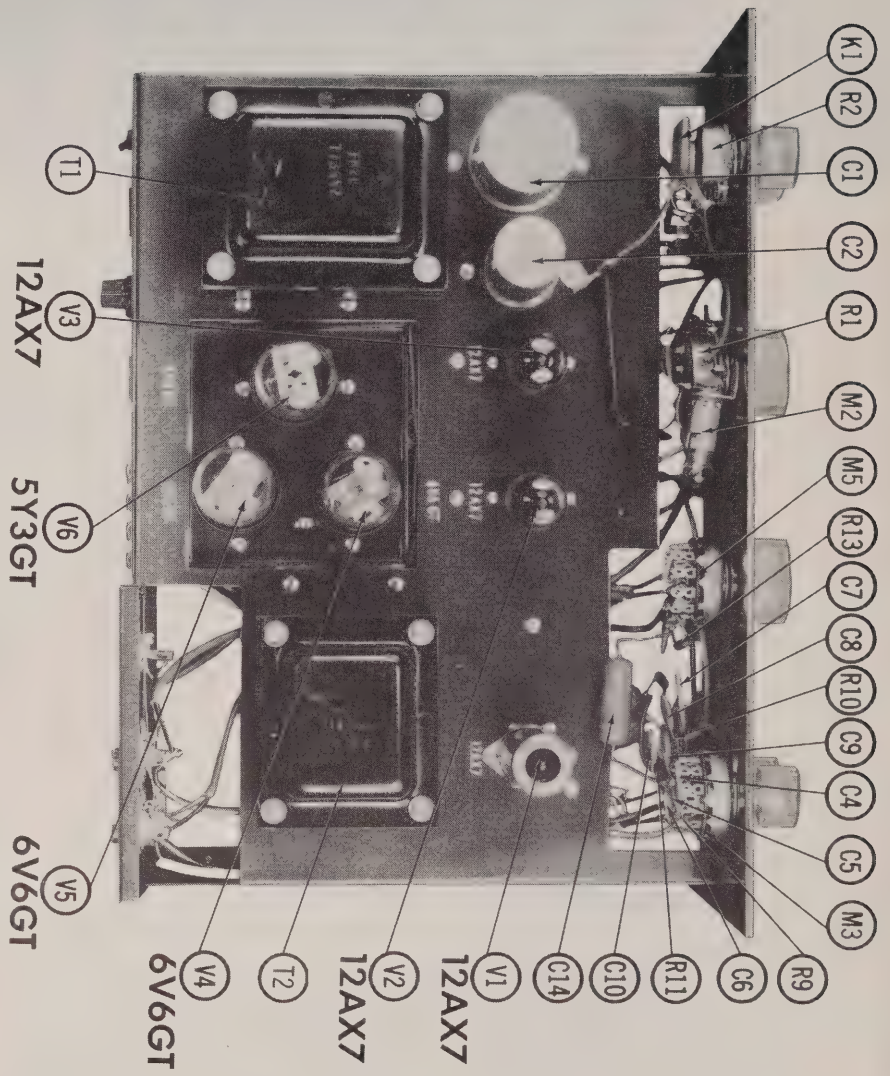
ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	GROMMES PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C3	100			1468-0001	D6-101	5W5T1	ED-100	MC235	1FM-31	
C4	1500					1R5D15	ED-1500	MCB456	MS-215	10%
C5	800					1R5T8		MCB251	MS-38	10%
C6	330				D6-331	L10T33	ED-330		MS-333	10%
C7	4000					1R5D4		MCB463	MS-24	10%
C8	2000					1R5D2		MCB457	MS-22	10%
C9	2000					1R5D2		MCB457	MS-22	10%
C10	1000					1R5D1	ED-1000	MCB255	MS-21	10%
C11	.047	400		P488N-047	DF-503	CUB4S47		GEM-4147	4TM-S47	
C12	10000			BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C13	.047	400		P488N-047	DF-503	CUB4S47		GEM-4147	4TM-S47	
C14	.047	400		P488N-047	DF-503	CUB4S47		GEM-4147	4TM-S47	
C15	1000					1R5D1	ED-1000	MCB255	MS-21	10%
C16	51					L10Q51	GP-51			
C17	10000			BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C18	10000			BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C19	10000			BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C20	.047	400		P488N-047	DF-503	CUB4S47		GEM-4147	4TM-S47	
C21	20			SI 20	D6-200	LT6Q2	GP-20	UC-542	5GA-Q2	①
C22	.047	400		P488N-047	DF-503	CUB4S47		GEM-4147	4TM-S47	
C23	250				D6-251	L10T25	ED-250	MCB240	MS-325	10%
C24	.047	400		P488N-047	DF-503	CUB4S47		GEM-4147	4TM-S47	
C25	.047	400		P488N-047	DF-503	CUB4S47		GEM-4147	4TM-S47	
C26	1000					1R5D1	ED-1000	MCB255	MS-21	10%

① Not used in some versions

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESIST-ANCE	WATTS	GROMMES PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	500K	½	MLC500K2T	BT-160		Q18-133XX	UDT-283	Volume, Tap ② 100K & 200K
B	Shaft			Not Req.		Not Req.	Not Req.	
R2A	1Meg	½	MTC-1M	B-69	A47-1Meg-S	Q11-137	U54	Treble
B	Shaft			Not Req.	RS-3	Not Req.	Not Req.	
R3A	1Meg	½	MTC-1M	B-69	A47-1Meg-S	Q11-137	U54	Bass
B	Shaft			Not Req.	RS-3	Not Req.	Not Req.	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	GROMMES PART No.	IRC PART No.	
R4	47K			BTS-47K	
R5	100K	1		BTA-100K	
R6	1000Ω			BTS-1000	
R7	3.3Meg			BTS-3.3Meg	
R8	100K			BTS-100K	
R9	100K			BTS-100K	
R10	1Meg			BTS-1Meg	
R11	3.3Meg			BTS-3.3Meg	
R12	4.7Meg			BTS-4.7Meg	
R13	100K			BTS-100K	
R14	47K			BTS-47K	
R15	22K			BTS-22K	
R16	470K			BTS-470K	
R17	100K			BTS-100K	
R18	470K			BTS-470K	
R19	3.3Meg			BTS-3.3Meg	
R20	100K			BTS-100K	
R21	100K			BTS-100K	
R22	1000Ω			BTS-1000	
R23	100K			BTS-100K	Note 1
R24	10K			BTS-10K	
R25	220K			BTS-220K	
R26	100Ω			BTS-100	
R27	220K			BTS-220K	
R28	47K			BTS-47K	
R29	1000Ω			BTS-1000	
R30	220K			BTS-220K	
R31	270K			BTS-270K	
R32	300Ω	7		PW7-300	
R33	47K			BTS-47K	
R34	22K			BTS-22K	
R35	1000Ω			BTS-1000	
R36	5600Ω	2		BTB-5600	

Note 1. Not used in some versions.

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	GROMMES PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC ② .63A	670VCT ② .072A	5VAC ② 2A	6.3VCT ② 1.9A	TP-2L ①	P9307	P-2952	PM8409	24R02	R-11B

① Alternate Part #TP-4L

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	GROMMES PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	7400Ω CT	16Ω Tap ② 8Ω, 4Ω	T0-11L ①						① Alternate Part #T0-12B

PARTS LIST AND DESCRIPTIONS (Continued)

COMPONENT COMBINATIONS

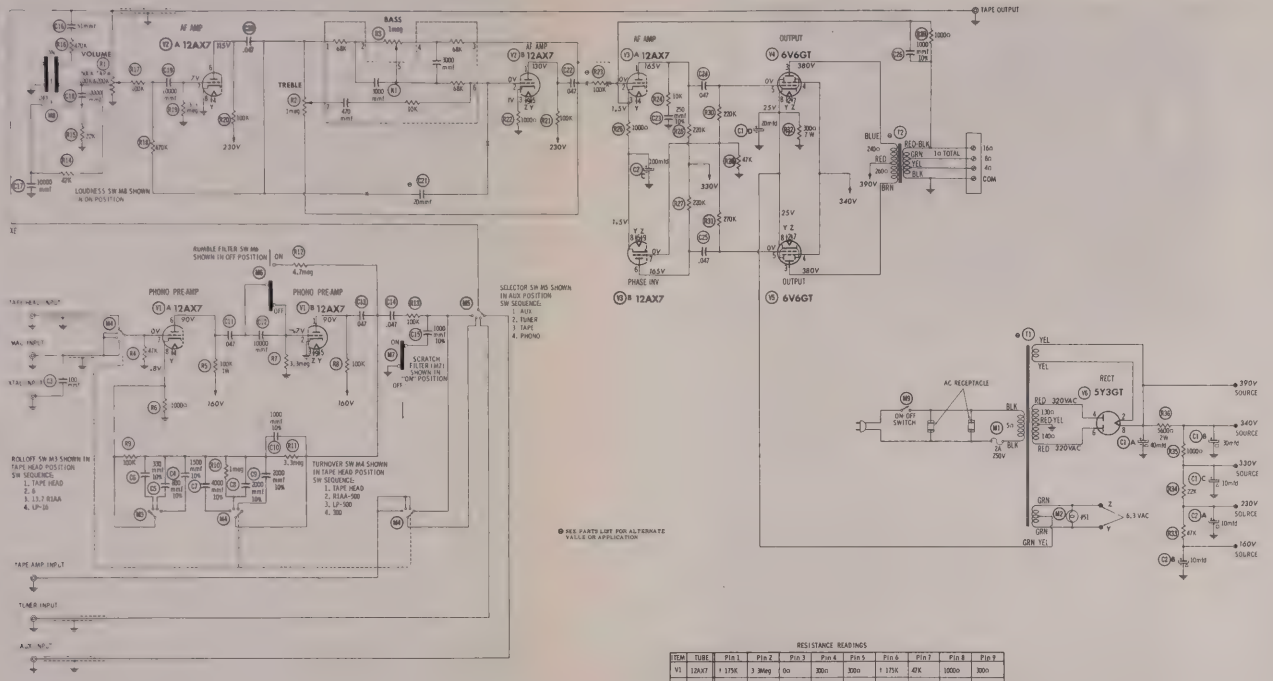
ITEM No.	USE	DESCRIPTION	GROMMES PART No.	REPLACEMENT DATA
K1	Tone Comp. Net.	3000MMF, 3000MMF, 470MMF 68K, 68K, 68K, 10K	S191B	

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			GROMMES PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG	2A 250V			312002. (3AG 2A 250V)	342001	AGC2	HKP

MISCELLANEOUS

ITEM No.	PART NAME	GROMMES PART No.	NOTES
M2	Pilot Light		#51
M3	Switch		Roll Off DB (Rotary Wafer Type)
M4	Switch		Turnover CPS (Rotary Wafer Type)
M5	Switch		Selector (Rotary Wafer Type)
M6	Switch		Rumble Filter (Slide Type DPST)
M7	Switch		Scratch Filter (Slide Type DPST)
M8	Switch		Loudness (Slide Type DPST)
M9	Switch		Power On-Off (Slide Type DPST)



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12AX7	† 175K	3.3Meg	0o	300o	300o	† 175K	47K	1000o	300o
V2	12AX7	† 125K	1.2Meg	1000o	300o	300o	† 125K	3.3Meg	0o	300o
V3	12AX7	† 225K	1.2Meg	1000o	300o	300o	† 225K	47K	2000o	300o
V4	6V6GT	NC	300o	† 240o	† 5600o	265K	TP	300o	300o	
V5	6V6GT	NC	300o	† 260o	† 5600o	265K	NC	300o	300o	
V6	5Y3GT	NC	220K(Min)	NC	130o	NC	140o	NC	220K(Min)	

† MEASURED FROM PIN 8 OF V6
NC NO CONNECTION
TP TIE POINT

1. DC voltage measurements taken with vacuum tube voltmeter, AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views
3. Measured values are from socket pin to common negative
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance of component values makes possible a variation of ±5% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
Howard W. Sams & Co., Inc. 1957

PHOTOFACT* Folder

*TRADE MARK

KNIGHT
MODELS 93SZ508, 93SZ741

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

KNIGHT
MODELS 93SZ508, 93SZ741

KNIGHT
MODELS 93SZ508, 93SZ741

TRADE NAME	Knight Models 93SZ508, 93SZ741
SUPPLIER	Allied Radio Corp., 100 N. Western Ave., Chicago 80, Illinois
TYPE SET	AC Operated 5 Channel 60 Watt Audio Amplifier
TUBES (Seven)	Types ECC83/12AX7 (or) 12AD7 Mic 1 Preamp. - Mic 2 Preamp., ECC83/12AX7 (or) 12AD7 AF Amplifier, 6C4 Phase Inverter, (2) EL34/6CA7 Output, 5U4GB Rectifier, 5Y3GT Rectifier
POWER SUPPLY	105-130 Volts AC-60 Cycles RATING .97 Amp. @ 117 Volts AC (100 Watts)

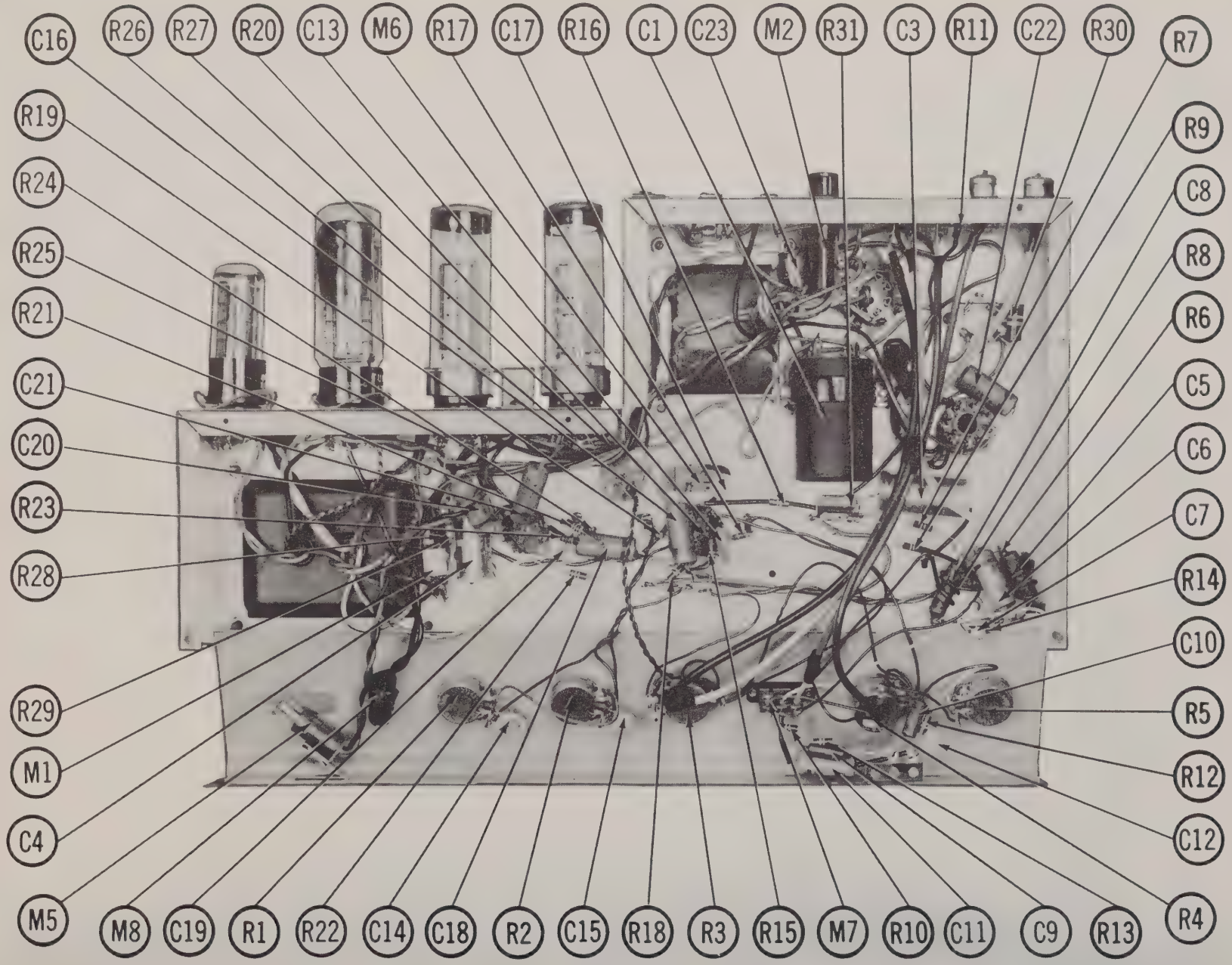
MODEL 93SZ741 HAS 4 SPEED MANUAL RECORD PLAYER

TRUMPET PROTECTOR SWITCH (M6)

The trumpet protector switch should be in the "ON" position when trumpet speakers are used. The switch should be in the "OFF" position to increase the low frequency response when trumpet speakers are not used.

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed. Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. © 1957 Howard W. Sams & Co., Inc., Indianapolis 5, Indiana. Printed in U.S. of America



CHASSIS BOTTOM VIEW

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	Mic 1 Preamplifier-Mic 2 Preamplifier	ECC83/12AX7	Note 1
V2	AF Amplifier	ECC83/12AX7	Note 1
V3	Phase Inverter	6C4	
V4	Output	EL34/6CA7	
V5	Output	EL34/6CA7	
V6	Rectifier	5U4GB	
V7	Rectifier	5Y3GT	

Note 1. Type 12AD7 may be used in some versions.

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA KNIGHT PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	▲40	300	(Note 1)	AFH2-57	B0450	FP217. 87	TMD-31	D-130	TVL-2764
B	▲40	300							
C2A	▲40	450	(Note 2)	AFH4-17	D0160	FP475. 5	TMQ-17	Q-055	TVL-4771. 3
B	■10	450							
C	▲10	450							
D	10	450							
C3	8	450		PRS450V8	BR845	TC71	TD-8-450	MT-4508	TVA-1704
C4	35	50		PRS150V40	BR505	TC48	TD-4-150	MT-1540	TVA-1308

Note 1. In some versions C1A is 80MFD and C1B is omitted.
Note 2. In some versions C2A is 60MFD and C2B & C2C are omitted.

FIXED CAPACITORS

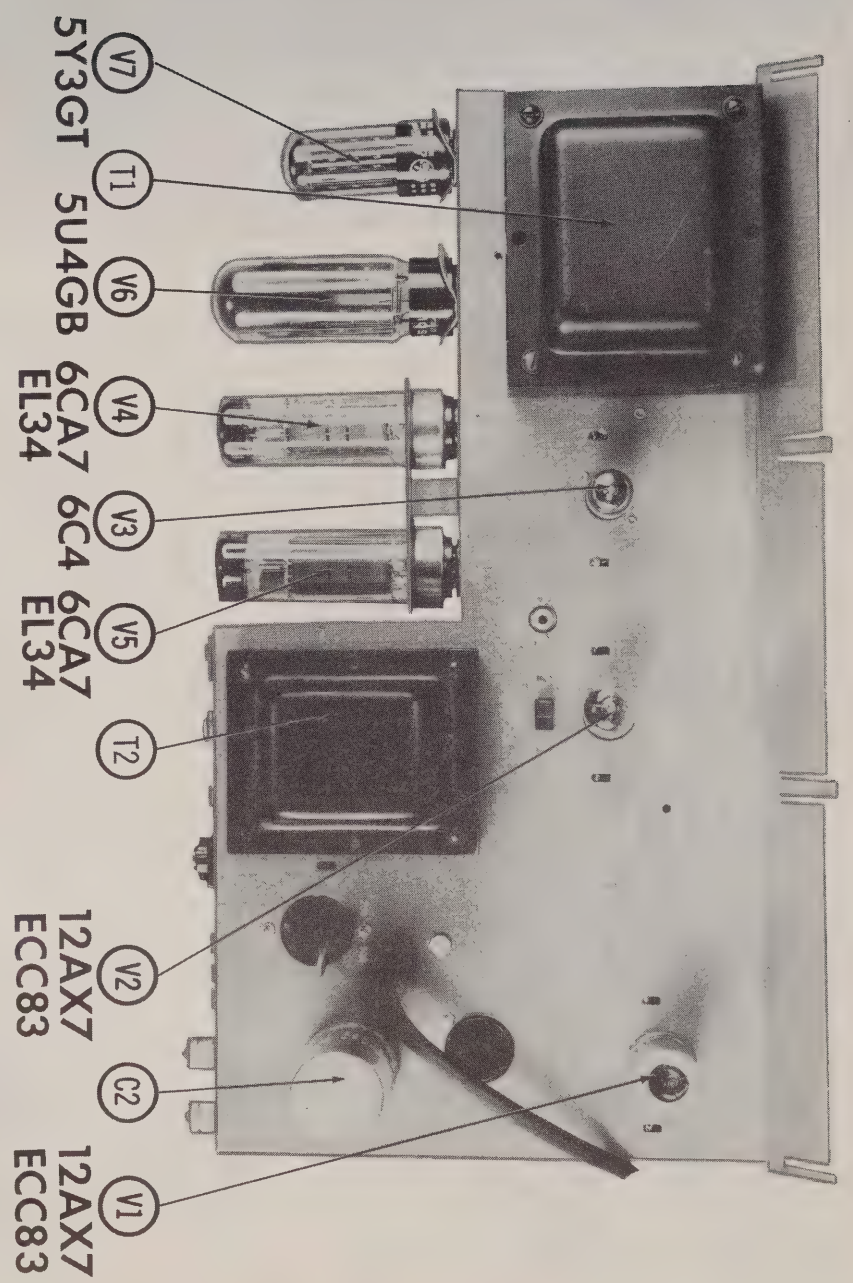
Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA KNIGHT PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C5	.047	600		P688N-047	DF-503	CUB6S47		GEM-6147	6TM-S47	
C6	.047	600		P688N-047	DF-503	CUB6S47		GEM-6147	6TM-S47	
C7	220			BPD-00022	DD-221	L10T22	ED-220	UC-5322	5GA-T22	
C8	.047	600		P688N-047	DF-503	CUB6S47		GEM-6147	6TM-S47	
C9	.0033	600		P688N-0033	D6-332	CUB6D33	GP-3300	GEM-6233	6TM-D33	
C10	.01	200		P488N-01	D6-103	CUB4S1	GP-10000	GEM-411	4TM-S1	
C11	.047	600		P688N-047	DF-503	CUB6S47		GEM-6147	6TM-S47	
C12	220			BPD-00022	DD-221	L10T22	ED-220	UC-5322	5GA-T22	
C13	100			NP0-S1 100	TCZ-100	C10T1C	TCO-100	ZT-531	5TCC-T1	NP0 10%
C14	2200									10%
C15	1000			BPD-001	DD-102	BYA6D1	ED-1000	DC521	5HK-D1	
C16	.047	600		P688N-047	DF-503	CUB6S47		GEM-6147	6TM-S47	
C17	1000			BPD-001	DD-102	BYA6D1	ED-1000	DC521	5HK-D1	
C18	.047	600		P688N-047	DF-503	CUB6S47		GEM-6147	6TM-S47	
C19	470			BPD-00047	DD-471	BYA10T47	ED-470	UC-5347	5GA-T47	
C20	.047	600		P688N-047	DF-503	CUB6S47		GEM-6147	6TM-S47	
C21	.047	600		P688N-047	DF-503	CUB6S47		GEM-6147	6TM-S47	
C22	.047	600		P688N-047	DF-503	CUB6S47		GEM-6147	6TM-S47	
C23	.02	600		P688N-02	DD-203	CUB6S2	ED-02	GEM-612	6TM-S2	

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA KNIGHT PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	500K	½	RP-504B-H	B-60	A47-500K-Z	Q13-133	U48	Treble
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	
R2	2Meg	½	RP-205B-J	B-77		Q17-139		Bass
R3	4Meg	½	RP-405A					Phono 1 & 2, Tap ⓐ 2Meg
R4A	500K	½	RP-504W-D	B-59	A47-500K-S	Q11-133	U50	Mic 2-Mag
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	
C	Switch			KB-1	SWE-12	76-1	US-26	
R5A	500K	½	RP-504B-H	B-60	A47-500K-Z	Q13-133	U48	Microphone 1
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	KNIGHT PART No.	IRC PART No.	
R6	10Meg			BTS-10Meg	Note 1
R7	220K			BTS-220K	
R8	10Meg			BTS-10Meg	Note 1
R9	220K			BTS-220K	
R10	100K			BTS-100K	
R11	47K			BTS-47K	
R12	220K			BTS-220K	
R13	22K			BTS-22K	
R14	220K			BTS-220K	
R15	470K			BTS-470K	
R16	220K			BTS-220K	
R17	3300Ω			BTS-3300	
R18	220K			BTS-220K	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	KNIGHT PART No.	IRC PART No.	
R19	3300Ω			BTS-3300	
R20	33K 5%			BTS-33K 5%	
R21	470K			BTS-470K	
R22	47K			BTS-47K	
R23	2200Ω			BTS-2200	
R24	47K			BTS-47K	
R25	100K			BTS-100K	
R26	100K			BTS-100K	
R27	68K			BTS-68K	
R28	33K 5%			BTS-33K 5%	
R29	330K			BTS-330K	Note 2
R30	10K	2		BTB-10K	
R31	22K	1		BTA-22K	

Note 1. Some versions may use 3.3Meg in this application.
Note 2. Not used in some version.

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	KNIGHT PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC @ .97A	940VCT @ .050A Tap @ 620V @ .011A Tap @ 70V @ .001A	5VAC @ 3A	5VAC @ 2A SEC. 4 6.3VCT @ 3.6A	LP-0256					

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	KNIGHT PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	3400Ω CT	500Ω Tap @ 250Ω, 70V, 16Ω, 8Ω, 4Ω	L0-0148						

PARTS LIST & DESCRIPTION (continued)

SELENIUM RECTIFIER

ITEM No.	RATING	REPLACEMENT DATA				NOTES
	CURRENT (Measured)	KNIGHT PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	SARKES TARZIAN PART No.	
M1	.0005A		1159	RS050	10	

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			KNIGHT PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M2	3AG	3A,125V Slo B10			313003. (3AG 3A 125V S/B)	341001	MDX3	HKP

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA					REMARKS
	KNIGHT PART No.	ASTATIC PART No.		ELECTRO-VOICE PART No.		
		CARTRIDGE	NEEDLE	CARTRIDGE	MOUNT	
M3		55T *P-55-T	GD	56 *2756	PT-2	* Tone arm complete with cartridge.

ASTATIC NEEDLE LISTING SHOWN ABOVE IS SPECIFIED FOR THE RESPECTIVE REPLACEMENT CARTRIDGE LISTED. FOR ORIGINAL CARTRIDGE NEEDLE REPLACEMENTS SEE BELOW.

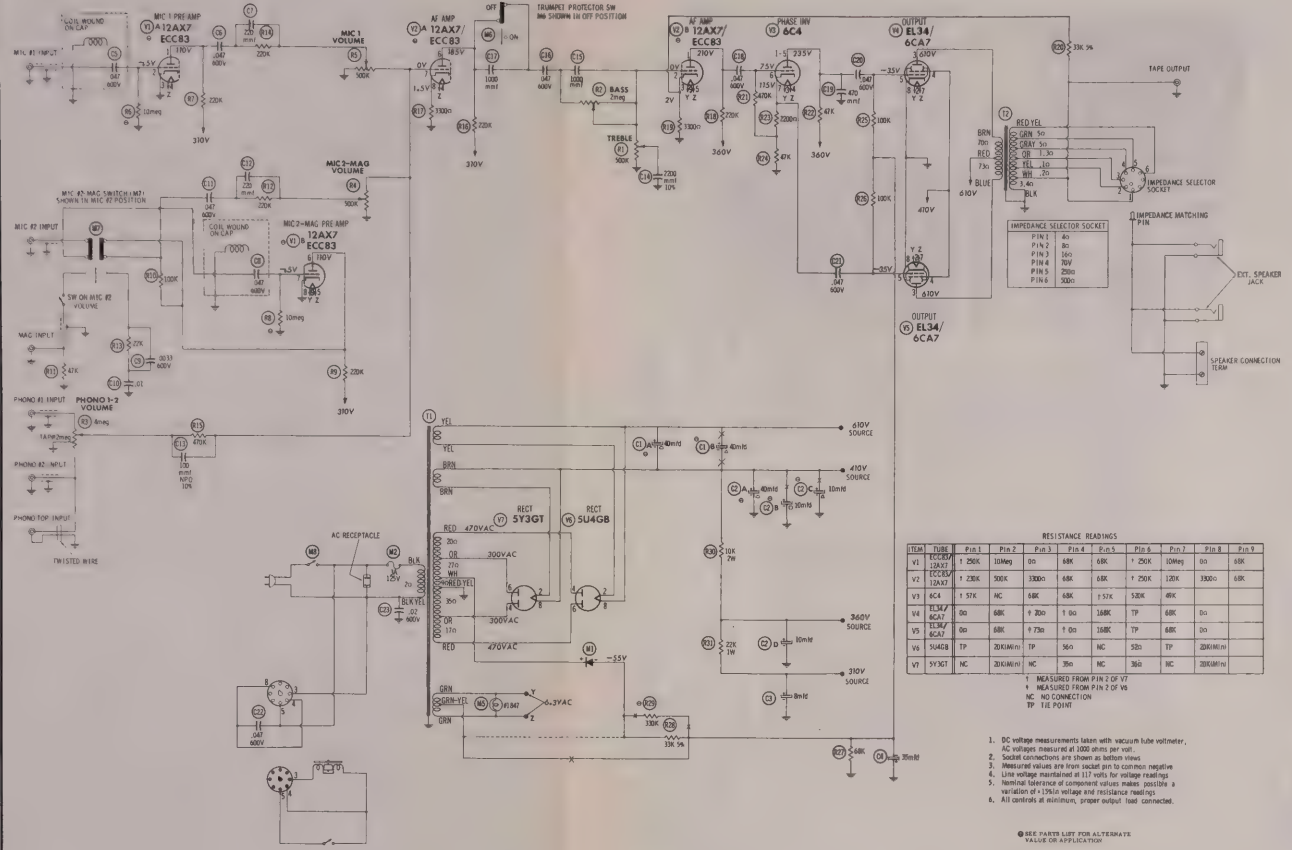
PHONO NEEDLE

(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

ITEM No.	REPLACEMENT DATA			REMARKS
	KNIGHT PART No.	JENSEN PART No.	WALCO PART No.	
M4		† A-71 or † ♦ A-71SD or ♦ A-71D	* W-8TPA or † W-8TPS or † ♦ W-8DS or ♦ W-8TPD	* Metal † Jewel ♦ Diamond

MISCELLANEOUS

ITEM No.	PART NAME	KNIGHT PART No.	NOTES
M5	Indicator Lamp		#1847
M6	Switch		Trumpet Protector (Slide Type SPST)
M7	Switch		Mic 2-Mag (Slide Type DPDT)
M8	Switch		Power On-Off (Toggle)



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	ECC83/ 12AX7	↑ 250K	10Meg	0Ω	68K	68K	↑ 250K	10Meg	0Ω	68K
V2	ECC83/ 12AX7	↑ 230K	500K	330Ω	68K	68K	↑ 250K	120K	330Ω	68K
V3	6C4	↑ 57K	NC	68K	68K	↑ 57K	520K	49K		
V4	EL34/ 6CA7	0Ω	68K	↑ 20Ω	↑ 0Ω	168K	TP	68K	0Ω	
V5	EL34/ 6CA7	0Ω	68K	↑ 73Ω	↑ 0Ω	168K	TP	68K	0Ω	
V6	5U4GB	TP	20KΩM/in	TP	56Ω	NC	52Ω	TP	20KΩM/in	
V7	5Y3GT	NC	20KΩM/in	NC	35Ω	NC	36Ω	NC	20KΩM/in	

↑ MEASURED FROM PIN 2 OF V7
↑ MEASURED FROM PIN 2 OF V6
NC NO CONNECTION
TP TIE POINT

1. DC voltage measurements taken with vacuum tube voltmeter, AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views
3. Measured values are from socket pin to common negative
4. Line voltage maintained at 117 volts for voltage readings
5. Nominal tolerance of component values makes possible a variation of ±15% in voltage and resistance readings
6. All controls at minimum, proper output load connected.

● SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

A PHOTOFACT STANDARD NOTATION SCHEMATIC
Howard W. Sams & Co., Inc. 1957

PHOTOFACT* Folder

*TRADE MARK

METEOR
MODEL 7047 (Ch. 528.47500)

METEOR
MODEL 7047 (Ch. 528.47500)

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

METEOR
MODEL 7047 (Ch. 528.47500)

TRADE NAME	Meteor Model 7047 (Ch. 528.47500)
SUPPLIER	Sears, Roebuck & Co., 925 S. Homan Ave., Chicago, Illinois
TYPE SET	AC Operated AM Receiver With 4 Speed Automatic Record Changer
TUBES (Five)	Types 12BE6 Converter, 12BA6 IF Amplifier, 12AT6 Det.-AVC-AF Amp., 50C5 Output, 35W4 Rectifier
POWER SUPPLY	110-120 Volts AC-60 Cycles
RATING	.28 Amp. @ 117 Volts (28 Watts Without Motor)
TUNING RANGE—BROADCAST	540KC - 1600KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use isolation transformer, if available. If not, connect a .1MFD capacitor in series with low side of signal generator and B-. Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to pin 7 (grid) of 12BE6 (V1). Low side to B-.	455KC (400~ Mod)	Tuning gang fully open	Across voice coil	A1, A2, A3, A4	Adjust for maximum deflection.
2.	"	"	1630KC	"	"	A5	"
3.		Loop	1400KC	1400KC	"	A6	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output. Repeat steps 1, 2, & 3 for greatest accuracy.

FOR SERVICE INFORMATION ON SILVERTONE RECORD CHANGER 567.40008 OR 567.40108 — SEE PHOTOFACT SET 365 FOLDER 13

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	Converter	12BE6	
V2	IF Amplifier	12BA6	
V3	Det.-AVC-AF Amp.	12AT6	
V4	Output	50C5	
V5	Rectifier	35W4	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	METEOR PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	70	150	18-12-2	PRS150V8040	BBRD8415	WD220	TDLD-10	MTD-303	TVA-2460
B	30	150							

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	METEOR PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C2	.05	400	16-50343	BPD-05	DF-503	CUB4S5		GEM-415	4TM-S5	
C3	470		17-47115	1468-00047	D6-471	5W5T47	GP-470	UC-5347	1FM-347	
C4	47		15-47016	BPD-000047	DD-470	L10Q47	ED-47	UC-5447	5GA-Q47	
C5	.05	400	16-50343	BPD-05	DF-503	CUB4S5		GEM-415	4TM-S5	
C6	.05	400	16-50343	BPD-05	DF-503	CUB4S5		GEM-415	4TM-S5	
C7	470		17-47115	1468-00047	D6-471	5W5T47	GP-470	UC-5347	1FM-347	
C8	.0047	600	16-47253	BPD-0047	D6-472	CUB6D47	GP-4700	GEM-6247	6TM-D47	
C9	.0047	600	16-47253	BPD-0047	D6-472	CUB6D47	GP-4700	GEM-6247	6TM-D47	
C10	.05	400	16-50343	BPD-05	DF-503	CUB4S5		GEM-415	4TM-S5	
C11	.05	400	16-50343	BPD-05	DF-503	CUB4S5		GEM-415	4TM-S5	

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	METEOR PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	1Meg	½	24-246-0	B-70-S	A47-1Meg-Z	Q13-137	U53	Volume
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	
C	Switch			Not Req.	SWE-12	76-1	US-26	
R2A	1Meg	½	24-245-2	B-69	A47-1Meg-S	Q11-137	U54	Tone
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

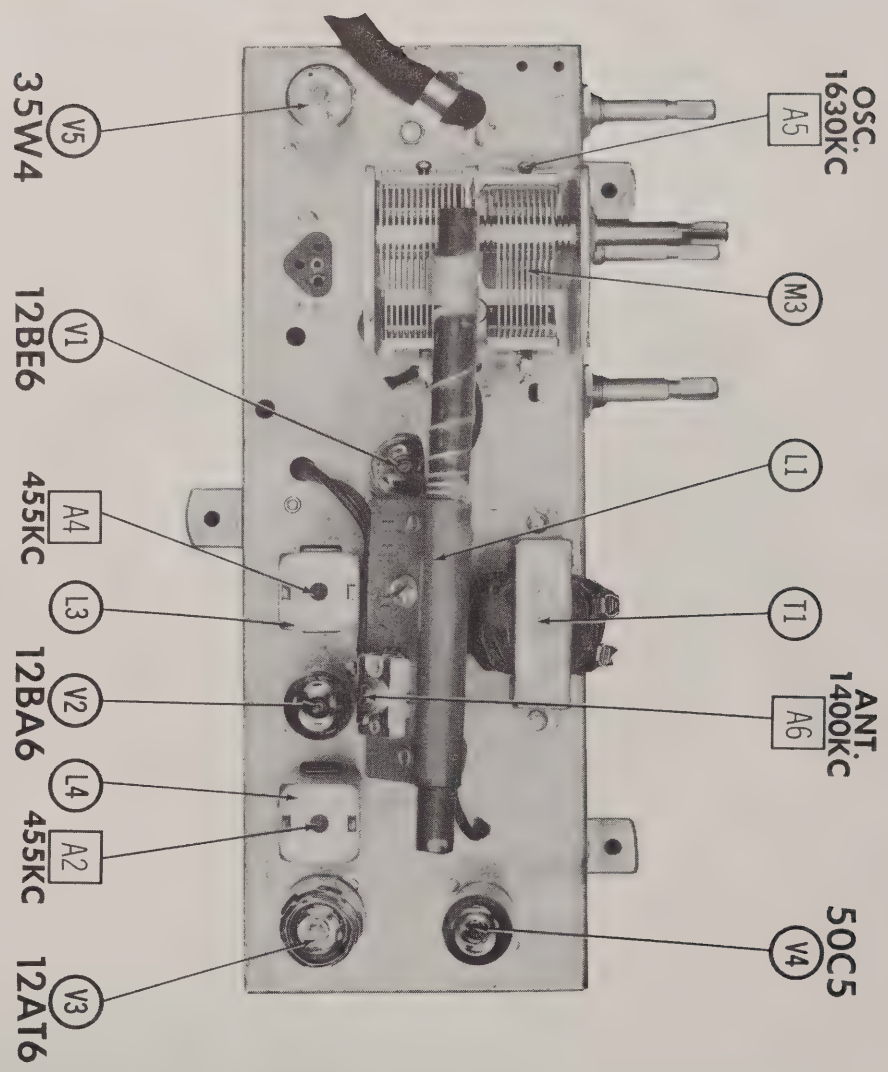
ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	METEOR PART No.	IRC PART No.	
R3	2.2Meg		60-22502	BTS-2.2Meg	
R4	22K		60-22302	BTS-22K	
R5	2.2Meg		60-22502	BTS-2.2Meg	
R6	82Ω		60-82001	BTS-82	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	METEOR PART No.	IRC PART No.	
R7	47K		60-47301	BTS-47K	
R8	180Ω		60-18101	BTS-180	
R9	27Ω		60-27001	BTS-27	
R10	1000Ω	1	60-10211	BTA-1000	

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	METEOR PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	2900Ω Tap@ 16Ω	2.1Ω	80-383-1						

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	METEOR PART No.	QUAM PART No.	
SP1	5"	PM	5.2Ω	33-258-4 ①	5AlRZ5.2	① Parallel & Phase
SP2	5"	PM	5.2Ω	33-258-4 ①	5AlRZ5.2	

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA				NOTES
		METEOR PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Loop Stick	82-107-0				Includes 3-85MMF Trimmer
L2	Osc. Coil	10-1-4	14-1074			
L3	Input IF	10-42-2	16-6758	BC-352	12-C1	
L4	Output IF	10-41-2	16-6758	BC-353	12-C2	

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	METEOR PART No.	REPLACEMENT DATA
K1	Audio Coup. Net.	5000MMF, 5000MMF, 220MMF, 250MMF, 10Meg, 470K, 470K	71-112	Centralab PC-159 Sprague DT-6

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA					REMARKS
	METEOR PART No.	ASTATIC PART No.		ELECTRO-VOICE PART No.		
		CARTRIDGE	NEEDLE	CARTRIDGE	MOUNT	
M1	720088	66-2	K-AG-J	52-2	PFT-1	

ASTATIC NEEDLE LISTING SHOWN ABOVE IS SPECIFIED FOR THE RESPECTIVE REPLACEMENT CARTRIDGE LISTED. FOR ORIGINAL CARTRIDGE NEEDLE REPLACEMENTS SEE BELOW.

PHONO NEEDLE

(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

ITEM No.	REPLACEMENT DATA			REMARKS
	METEOR PART No.	JENSEN PART No.	WALCO PART No.	
M2	720111	* A-762 or † A-672 or ♦ A-672D	* W39AGA	* Metal † Jewel ♦ Diamond

MISCELLANEOUS

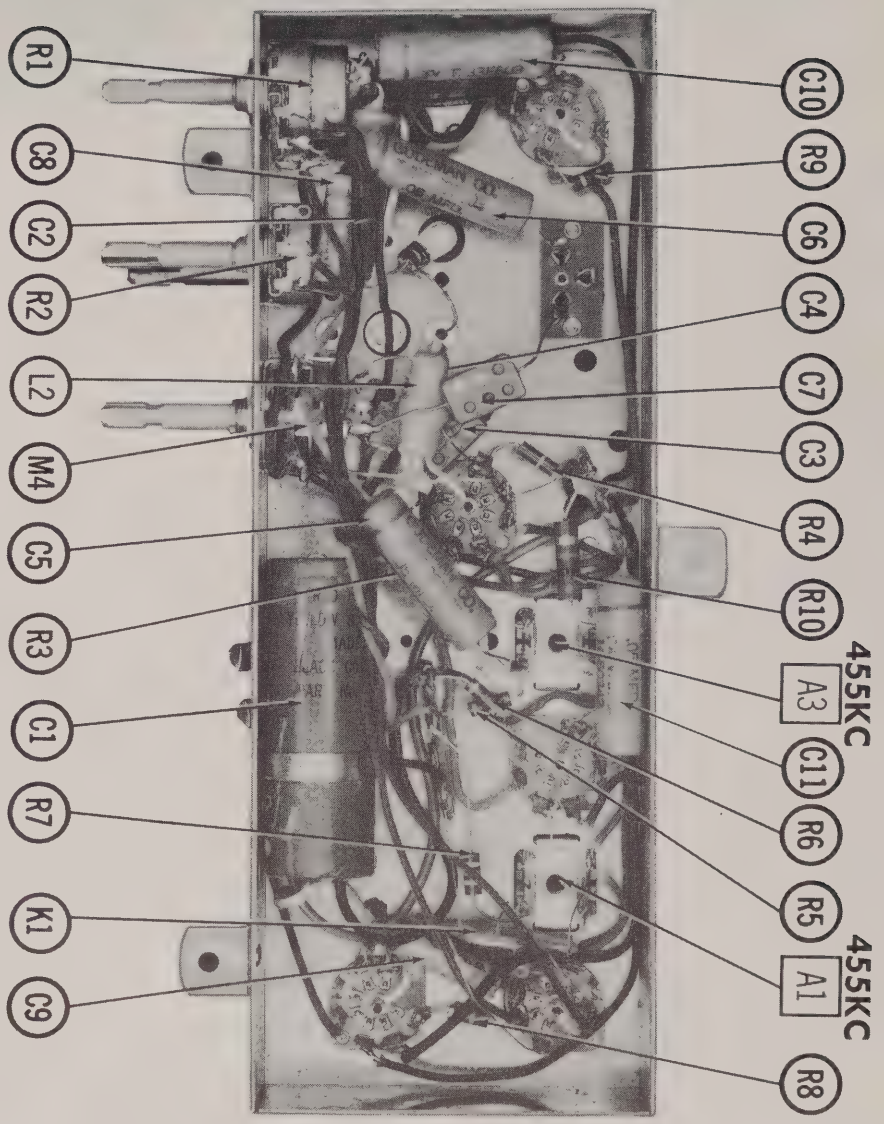
ITEM No.	PART NAME	METEOR PART No.	NOTES
M3	Tuning Cap.	19-46-2	2 Gang (Ant. 15-465MMF, Osc. 20-195MMF)
M4	Switch	69-216-0	Radio-Phono (Rotary Wafer Type)

CABINETS & CABINET PARTS

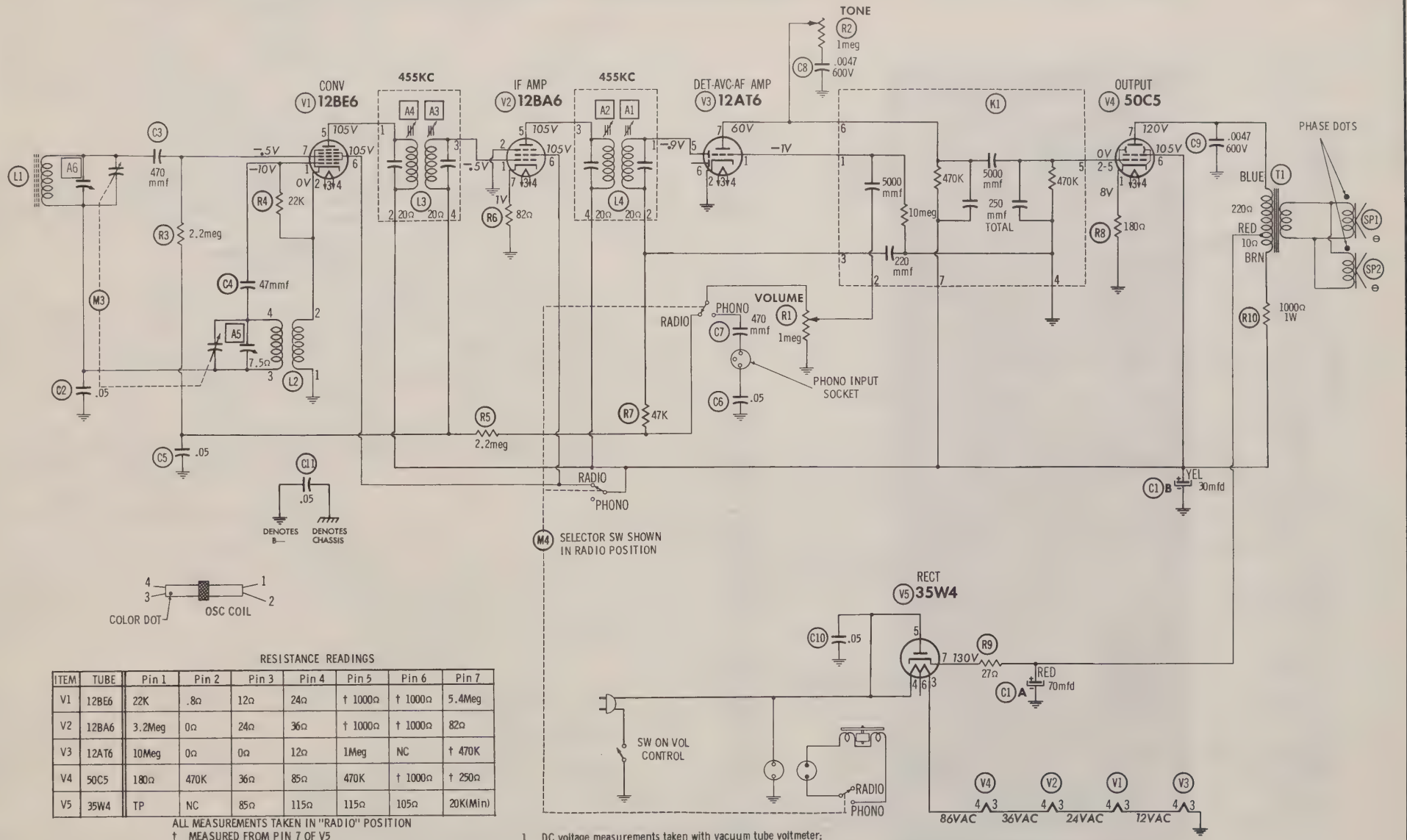
(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	52-707-0	Tuning
Knob	52-705-0	On-Off-Volume
Knob	52-704-0	Tone
Knob	52-706-0	Radio-Phono
Cabinet	42-3-3	Includes Lid
Legs	49-124	Cabinet (4)

CHASSIS—BOTTOM VIEW



METEOR MODEL 7047 (Ch. 528.47500)



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V1	12BE6	22K	.8Ω	12Ω	24Ω	† 1000Ω	† 1000Ω	5.4Meg
V2	12BA6	3.2Meg	0Ω	24Ω	36Ω	† 1000Ω	† 1000Ω	82Ω
V3	12AT6	10Meg	0Ω	0Ω	12Ω	1Meg	NC	† 470K
V4	50C5	180Ω	470K	36Ω	85Ω	470K	† 1000Ω	† 250Ω
V5	35W4	TP	NC	85Ω	115Ω	115Ω	105Ω	20K(Min)

ALL MEASUREMENTS TAKEN IN "RADIO" POSITION
† MEASURED FROM PIN 7 OF V5
NC NO CONNECTION
TP TIE POINT

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to commom negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM.

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

A PHOTOFACT STANDARD NOTATION SCHEMATIC
Howard W. Sams & Co., Inc. 1957

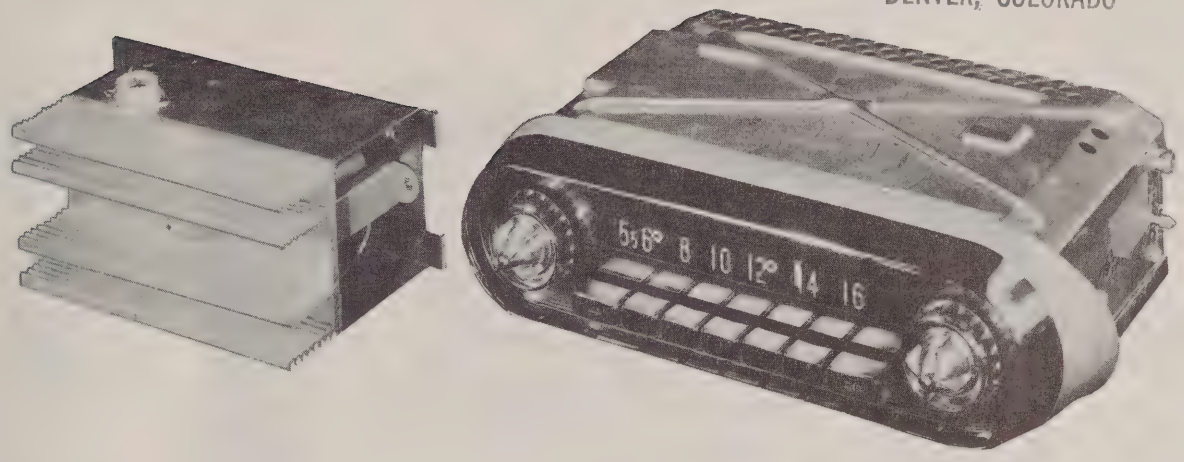
PHOTOFACT* Folder

*TRADE MARK

MOPAR
MODELS 918, 919, 919HR

PROPERTY OF
D. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

MOPAR
MODELS 918, 919, 919HR



MOPAR
MODELS 918, 919, 919HR

TRADE NAME	Mopar Models 918 (For 1957 Dodge D66, D67, D70, D71, D72 Automobiles); 919, 919HR (For 1957 DeSoto S25, S26, S27 Automobiles)
MANUFACTURER	Motorola Inc., 4545 W. Augusta Blvd., Chicago 51, Illinois
TYPE SET	Battery Operated Custom Built AM Automobile Receiver
TUBES (Six)	Types 12BL6 RF Amplifier, 12AD6 Converter, 12BL6 IF Amplifier, 12F8 Det. - AVC-AF Amp., 12K5 Driver, 12AL8 Trigger-Relay Control
POWER SUPPLY	12 Volt Storage Battery
TUNING RANGE—BROADCAST 540KC - 1600KC	RATING 2.6 Amp. @ 12.6 Volts DC

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed. Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. © 1957 Howard W. Sams & Co., Inc., Indianapolis 5, Indiana. Printed in U.S. of America

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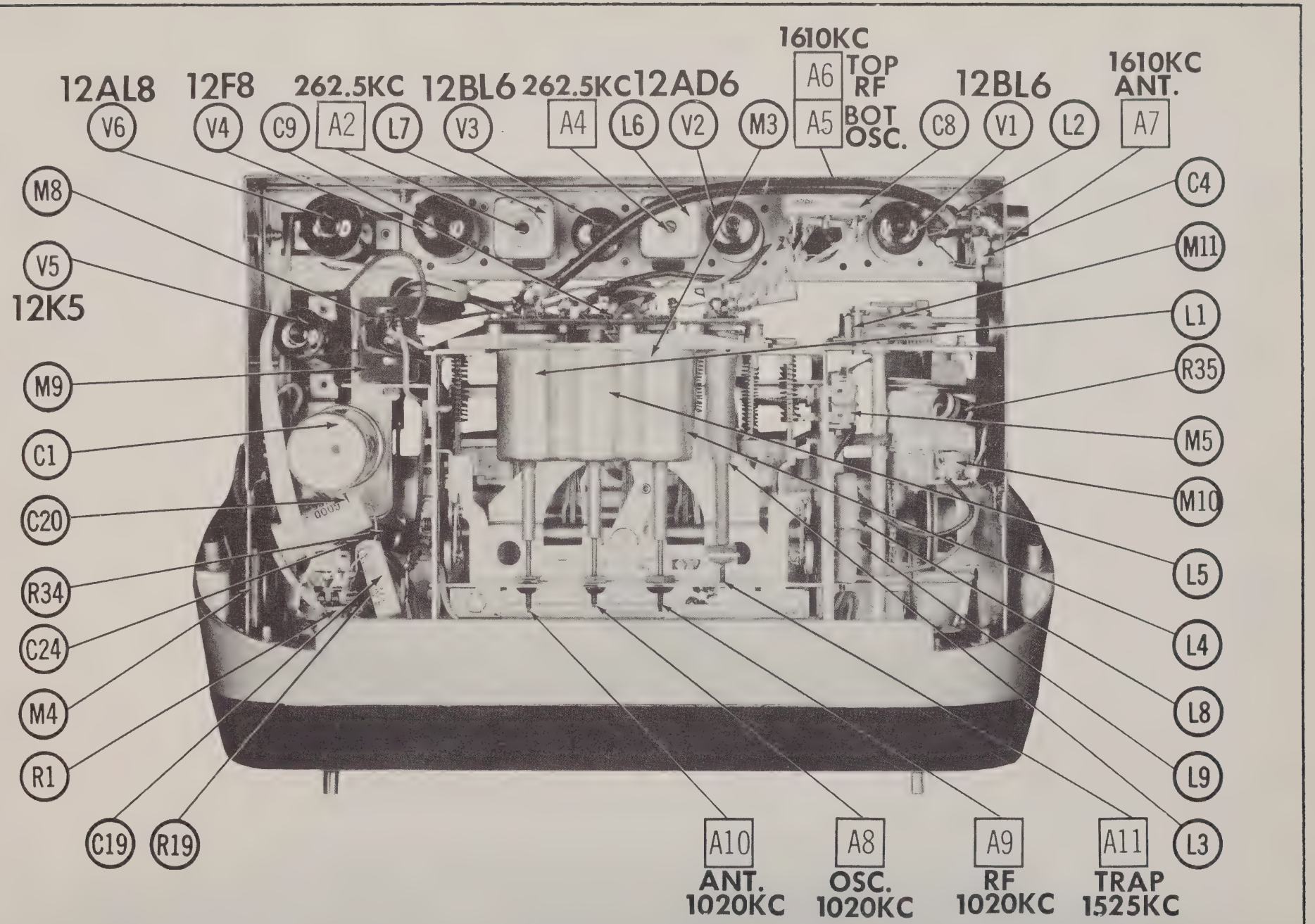
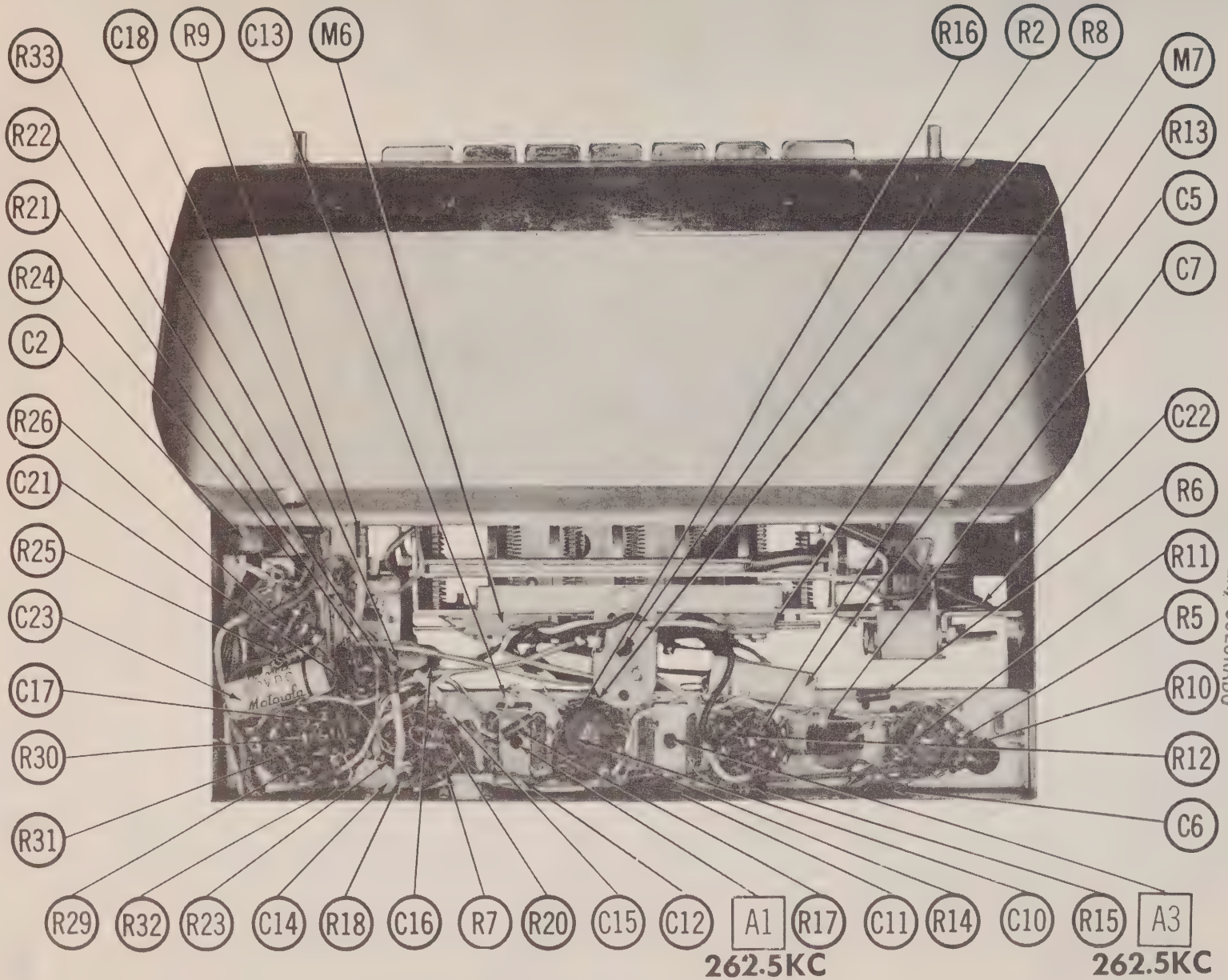


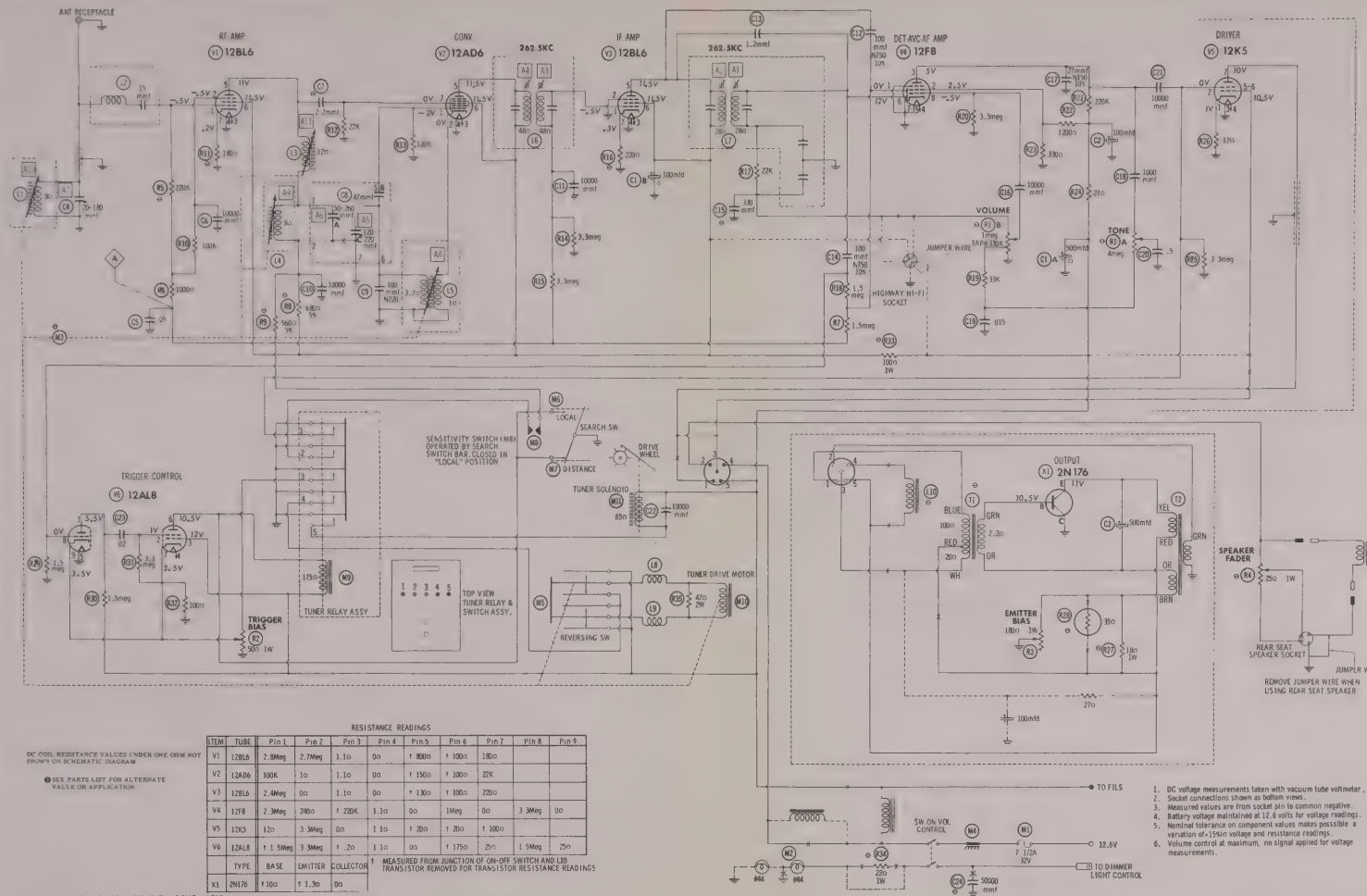
CHASSIS TOP VIEW



CHASSIS BOTTOM VIEW

PROPERTY OF
L. F. BLANKENSHIP,
3924 MEADE St.,
DENVER, COLORADO

MOPAR
MODEL 918



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12BL6	2.8Meg	2.7Meg	1.1Ω	0Ω	↑ 800Ω	↑ 100Ω	180Ω		
V2	12AD6	100K	1Ω	1.1Ω	0Ω	↑ 150Ω	↑ 100Ω	22K		
V3	12BL6	2.4Meg	0Ω	1.1Ω	0Ω	↑ 130Ω	↑ 100Ω	220Ω		
V4	12F8	2.3Meg	240Ω	↑ 220K	1.1Ω	0Ω	1Meg	0Ω	3.3Meg	0Ω
V5	12K5	12Ω	3.3Meg	0Ω	1.1Ω	↑ 20Ω	↑ 20Ω	↑ 100Ω		
V6	12AL8	↑ 1.5Meg	3.3Meg	↑ .2Ω	1.1Ω	0Ω	↑ 175Ω	25Ω	1.5Meg	25Ω
	TYPE	BASE	EMITTER	COLLECTOR						
X1	2N176	↑ 10Ω	↑ 1.3Ω	0Ω						

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

* MEASURED FROM JUNCTION OF ON-OFF SWITCH AND L10 TRANSISTOR REMOVED FOR TRANSISTOR RESISTANCE READINGS

1. DC voltage measurements taken with vacuum tube voltmeter.
2. Socket connections shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Battery voltage maintained at 12.6 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
Howard W. Sams & Co., Inc. 1957

379-10

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to pin 7 (grid) of 12AD6 (V2). Low side to chassis.	262.5KC (400^ Mod)	High Frequency End Stop	DC probe to point (A). Common to chassis.	A2, A3, A4	Adjust for maximum
2.	.1MFD	"	"	"	"	A1	Adjust for MINIMUM
3.	Fig. 1	Thru dummy to Antenna receptacle	1610KC	"	"	A5, A6, A7	Adjust for maximum
	If tuner has NOT been tampered with or associated components have NOT been replaced, proceed with step 7. It is not necessary to perform steps 4, 5 and 6 unless tuner has been tampered with or associated components have been replaced. If necessary, remove escutcheon to expose tuning core screws. Back out tuning cores (A5, A6, A7) from coils but not out of coil forms.						
4.	Fig. 1	Thru dummy to Antenna receptacle	1610KC	High Frequency End Stop	DC probe to point (A). Common to chassis.	A5, A6, A7	Adjust for maximum
5.	Fig. 1	"	1020KC	49/64" from High Frequency End Stop	"	A8, A9, A10	Adjust for maximum. Repeat steps 4 & 5 until no further improvement is noted. Step 4 should be the last step.
6.	Fig. 1	"	1525KC	1000KC	"	A11	Adjust for MINIMUM
7.	With receiver installed in car and antenna fully extended, tune in a weak station near 1400KC and adjust A7 for maximum output.						

POINTER CALIBRATION

Tune receiver to a 1000KC signal and adjust pointer adjusting cam until pointer coincides with 1000KC mark on dial scale.

PUSHBUTTON ADJUSTMENT

1. Antenna should be fully extended and receiver allowed to warm up 15 minutes.
2. Pull pushbutton out.
3. Manually tune in the desired station. Lock pushbutton by pressing in firmly.
4. Repeat procedure for remaining pushbuttons.

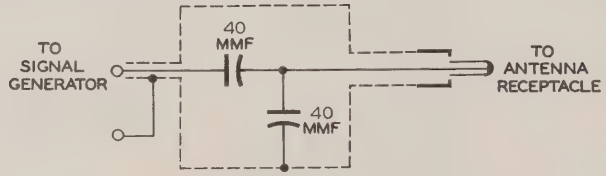


FIG. 1

EMITTER BIAS ADJUSTMENT (R3)

The emitter bias control (R3) should be adjusted after the transistor is replaced.
Be sure that the transistor mounting screws are tightened securely. The bias control (R3) should be set to its maximum resistance position.
Connect the positive lead of a low range VTVM to the low side of the output transformer (T2) primary (junction of R27, R28 & T2). Connect the negative lead of the VTVM to the high side of the output transformer (T2) primary (junction of C3, X1 emitter & T2).
Apply power to the receiver and adjust for 12 volts DC at the receiver "A" lead.
Adjust R3 for a reading of .86 volts on the VTVM. This is equivalent to a current flow of 900MA through the transistor.

TRIGGER BIAS (R2)

The trigger bias control (R2) should be adjusted after the Trigger-Relay Control Tube (V6) is replaced.
Disconnect the antenna. Connect a low range VTVM from the cathode (pin 7) of the Trigger-Relay Control Tube (V6) to the chassis. Press the "Distant" search button and allow the receiver tuner to sweep. Adjust R2 for .6 volts DC while the tuner is sweeping.

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	RF Amplifier	12BL6	
V2	Converter	12AD6	
V3	IF Amplifier	12BL6	

ITEM No.	USE	TYPE	NOTES
V4	Det.-AVC-AF Amp.	12F8	
V5	Driver	12K5	
V6	Trigger-Relay Control	12AL8	

TRANSISTOR

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA			NOTES
			CBS PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
X1	2N176	Output			2N176	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	MOPAR PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	■500	16	23B539261	AFH2-02-10	B0045	WP200.5			R2452 *
B	▲100	16							
C2	100	16	23B540615	PRS25V100	BBR100-15	TC2501	TD-100-15	MTH-1510	TVA-1160
C3	500	3	23B539260	PRS6V500	BR500-6	TC605	TD-500-6	MTH-0650	TVA-1103

* Non Catalog Item

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

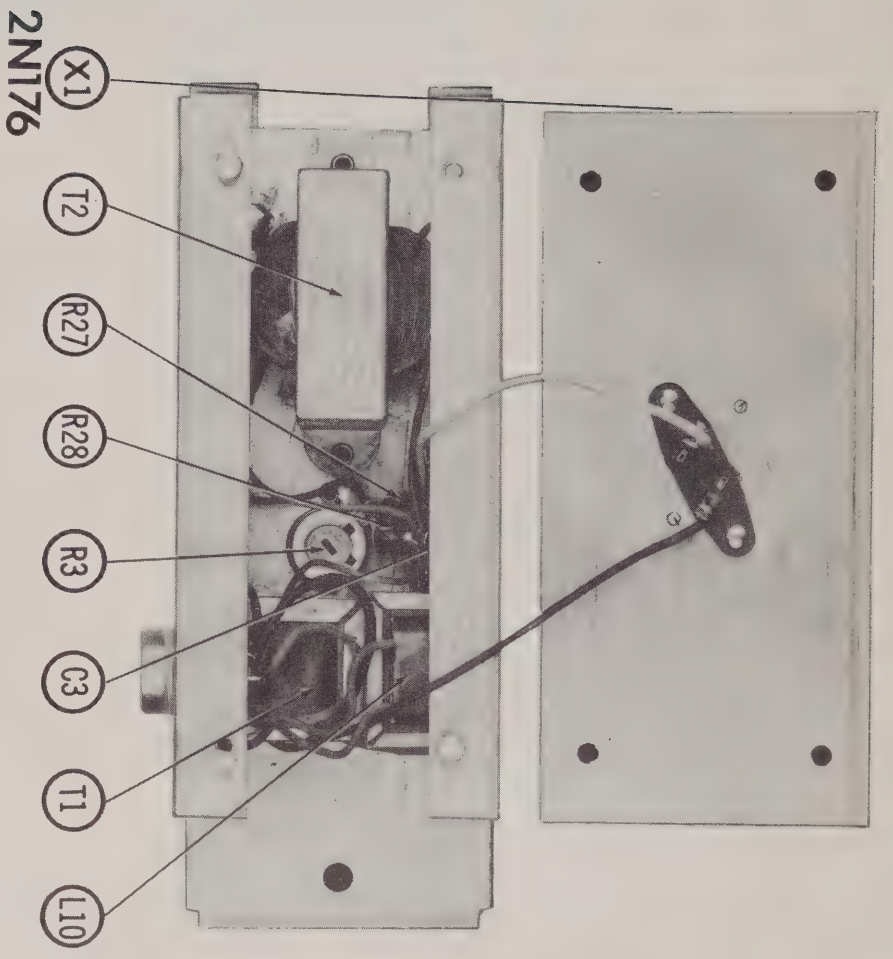
ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	MOPAR PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C4	20-180		20B534809							
C5	.05	200	8R121005	P288N-05	DF-503	CUB2S5		GEM-415	2TM-S5	
C6	10000		21R121946	BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C7	2.2		21R115948	NP0-SI 2.2	TCZ-2R2	C10V22C	TCO-2.2		5TCCB-V22	①
C8A	50-260		} 20B539699							
B	47									
C	120-220									
C9	100		21R124032							N220
C10	10000		21R121946	BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C11	10000		21R121946	BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C12	100		21R410036	N750-SI 100	TCN-100	C10T1U	TC7-100	NT-531	5TCU-T1	N750 10%
C13	1.2		21R115958							
C14	100		21R410036	N750-SI 100	TCN-100	C10T1U	TC7-100	NT-531	5TCU-T1	N750 10%
C15	330		21R410118	BPD-00033	DD-331	L10T33	ED-330	UC-5333	5GA-T33	②
C16	10000		21R121946	BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C17	27		21R119896							N150 10%
C18	1000		21R410127	BPD-001	DD-102	BYA6D1	ED-1000	DC521	5HK-D1	
C19	.015	200	8R122256	P288N-015	DD16-153	CUB6S15	ED-015	GEM-4115	4TM-S15	
C20	.5	100	8K122076	P288N-5		CUB2P5		GEM-205	2TM-P5	
C21	10000		21R121946	BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C22	10000		21R121946	BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C23	.02	200	8R121003	P288N-02	DD-203	CUB2S2	ED-02	CUB-412	2TM-S2	
C24	50000		21A740805	BPD-05	DF-503				TG-S50	③

① Model 918 prior to serial number 4600 & Models 919 & 919HR prior to serial number 11050 use 8.2MMF in this application (Part #21R120159).

② Model 918 prior to serial number 4600 & Models 919 & 919HR prior to serial number 11050 use 1000MMF in this application (Part #21R410127).

③ Not used in Model 918 prior to serial number 4600 & Models 919 & 919HR prior to serial number 11050.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA MOPAR PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	4Meg	½	18B539819 ①	F1-83	RTV-616C		■ UE3746S	Tone
B	1Meg	½		R2-59	Not Req.			Volume, Tap ② 330K
C	Switch			KB-7	Not Req.			
R2	50Ω	1	18K541099					Trigger Bias (Wire Wound)
R3	180Ω	1	18K540512		39-200			Emitter Bias (Wire Wound)
R4	25Ω	1	18K540132 ②					Speaker Fader (Wire Wound)

① Part #18K539820 used in Model 918. ② Part #18B540131 used in Model 918.

■ STA-LOC Equivalent FB46L, OS1625, RU16T334, IS2062, US-42.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA MOPAR PART No.	IRC PART No.	NOTES
R5	220K			BTS-220K	Note 1
R6	1000Ω		6R6301	BTS-1000	
R7	1.5Meg		6R6460	BTS-1.5Meg	
R8	680Ω 5%		6R5651	BTS-680 5%	Note 2
R9	560Ω 5%		6R400058	BTS-560 5%	Note 3
R10	100K		6R6075	BTS-100K	
R11	180Ω		6R5660	BTS-180	Note 4
R12	22K		6R6028	BTS-22K	
R13	100K		6R6075	BTS-100K	
R14	3.3Meg		6R6497	BTS-3.3Meg	
R15	3.3Meg		6R6497	BTS-3.3Meg	
R16	220Ω			BTS-220	Note 5
R17	22K		6R6028	BTS-22K	
R18	1.5Meg		6R6460	BTS-1.5Meg	
R19	33K		6R6410	BTS-33K	
R20	3.3Meg		6R2118	BTS-3.3Meg	

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA MOPAR PART No.	IRC PART No.	NOTES
R21	220K		6R6407	BTS-220K	
R22	1200Ω		6R6393	BTS-1200	
R23	330Ω		6R6022	BTS-330	
R24	27Ω		6R5683	BTS-27	
R25	3.3Meg		6R2118	BTS-3.3Meg	
R26	12Ω		6R2030	BTS-12	
R27	18Ω	1		BTA-18	Note 6
R28	35Ω				Note 7
R29	1.5Meg		6R6460	BTS-1.5Meg	
R30	1.5Meg		6R6460	BTS-1.5Meg	
R31	3.3Meg		6R2118	BTS-3.3Meg	
R32	100Ω		6R6326	BTS-100	
R33	100Ω	1		BTA-100	Note 8
R34	22Ω	1	6R2009	BTA-22	Note 9
R35	47Ω	2	6R488035	BTB-47	

Note 1. Some versions may use 12K in this application (Part #6R6393).
Note 2. Model 918 prior to serial #4600 & Models 919, 919HR prior to serial #11050 use 10% unit in this application (Part #6R6040).
Note 3. Model 918 prior to serial #4600 & Models 919, 919HR prior to serial #11050 use 470Ω 10% in this application (Part #6R6090).
Note 4. Model 918 prior to serial #4600 & Models 919, 919HR prior to serial #11050 use 10Ω 20% in this application (Part #6R118245).
Note 5. Some versions use 100Ω in this application (Part #6R6018).
Note 6. Some versions use 2W unit in this application (Part #6R118238).
Note 7. Temperature Compensating Unit. Not used in Model 918 prior to serial #4600 & Models 919 & 919HR prior to serial #11050.
Note 8. Some versions use 2W unit in this application (Part #6R3963).
Note 9. Not used in Model 918. Models 919, 919HR prior to serial #11050 use 27Ω 2W in this application (Part #6R3994).

TRANSFORMER (DRIVER)

ITEM No.	Turns Ratio PRI.	Turns Ratio SEC.	REPLACEMENT DATA MOPAR PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T1	9:	1	25K542078①						

① Part #25C540614 used in Model 918 with serial number prior to 4600 and Models 919 & 919HR with serial number prior to 11050.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA MOPAR PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T2	100Ω	3-4Ω	25C540429						

SPEAKER

ITEM No.	TYPE SIZE	TYPE FIELD	TYPE V. C. IMP.	REPLACEMENT DATA MOPAR PART No.	QUAM PART No.	NOTES
SP1	6½ X 7½	PM	3-4Ω	50D540194 ① 50K540003 ②	57A21	① Used in all 919, 919HR Models. Used in Model 918 with serial number above 4600. ② Used in Model 918 with serial number prior to 4600.
	5 X 7	PM				

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA MOPAR PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	Antenna Coil	24C536308				
L2	IF Trap	24A538910				① Includes 15MMF Cap.
L3	Trap Coil	24B539651				
L4	RF Coil	24C536308				
L5	Osc. Coil	24B536300				
L6	Input IF	24K537792	16-6752	BC-350 BC-316	12-H1	
L7	Output IF	24B533073				
L8	Hash Choke	24A535789	19-1003			3 Microhenries
L9	Hash Choke	24A535789	19-1003			3 Microhenries

① Part #24K539955 (includes 27MMF capacitor) used in Model 918 with serial number prior to 4600.
Part #24K539609 (includes 27MMF capacitor) used in Models 919 & 919HR with serial number prior to 11050.

FILTER CHOKE

ITEM No.	RATINGS TOTAL DIRECT CURRENT	RATINGS D. C. RESISTANCE	RATINGS INDUCTANCE (0 CURRENT 1000 ~)	REPLACEMENT DATA MOPAR PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L10	2.6A	.5Ω	4.5 Mlhy.	25B542077 ①					

① Part #24K540517 used in Model 918 with serial number prior to 4600 & Models 919 & 919HR with serial number prior to 11050.

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA MOPAR PART No. FUSE	MOPAR PART No. HOLDER	LITTELFUSE PART No. FUSE	LITTELFUSE PART No. HOLDER	BUSS PART No. FUSE	BUSS PART No. HOLDER
M1	SFE	7½A 32V	65R122346		30307.5 (7AG 7½A 32V)	155009	SFE 7½	HHH

MISCELLANEOUS

ITEM No.	PART NAME	MOPAR PART No.	NOTES
M2	Dial Light	65R10867	#44 (2 used in Model 918)
M3	Tuner	77E539484	(ST-201) Complete, Models 919, 919HR
	Tuner	77E539648	(ST-199) Complete, Model 918
M4	Sel. Spark Plate	48K539953	Includes Bushing (43A539954), Washer (4K540945), Eyelet(5K119263)
M5	Switch	40B535396	Reversing
M6	Switch	40A539926	Search, Local
M7	Switch	40A539926	Search, Distant
M8	Switch	40A535418	Sensitivity
M9	Relay	80K541296	
M10	Motor	59K540363	Drive
M11	Solenoid	59A537563	

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Escutcheon	13C539098	Models 919 & 919HR
Escutcheon	13D539442	Model 918
Knob	1V540099	Volume & Tuning, Models 919 & 919HR
Knob	1V540122	Volume & Tuning, Model 918
Knob	36C539088	Tone & Fader, Models 919 & 919HR
Knob	36B539078	Tone & Fader, Model 918
Dial Scale	64C539095	Background, Models 919 & 919HR
Pointer	64B539096	Background, Models 919 & 919HR
Dial Scale	34C539142	Models 919 & 919HR
Dial Scale	34C539581	Model 918
Crystal	61B539580	Dial Scale, Model 918
Pointer	1A539631	Includes Stud Assembly, Model 918
Pointer	1A539632	Includes Stud Assembly, Models 919 & 919HR

PHOTOFACT* Folder

*TRADE MARK

RETMA MEMBER

NEWCOMB MODEL E-25

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE St.
DENVER, COLORADO

NEWCOMB
MODEL E-25

NEWCOMB
MODEL E-25

TRADE NAME	Newcomb Model E-25
MANUFACTURER	Newcomb Audio Products Co., 6824 Lexington Ave., Hollywood 38, Calif.
TYPE SET	AC Operated 3 Channel 25 Watt Audio Amplifier
TUBES (Six)	Types 12AX7 Mic 1 - Mic 2 Preamplifier, 6SJ7 AF Amplifier, 6J5 Phase Inverter, (2) 6L6GB Output, 5V4G Rectifier
POWER SUPPLY	110-120 Volts AC-60 Cycles RATING .9 Amp. @ 117 Volts AC (90 Watts)

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed. Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. © 1957 Howard W. Sams & Co., Inc., Indianapolis 5, Indiana. Printed in U.S. of America

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	Mic 1 - Mic 2 Preamp.	12AX7	
V2	AF Amplifier	6SJ7	
V3	Phase Inverter	6J5	
V4	Output	6L6GB	
V5	Output	6L6GB	
V6	Rectifier	5V4G	Note 1

Note 1. Some versions may use a 5Z4 in this application.

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	NEWCOMB PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	▲20	475	CE-30	AFH4-19-10	DO179.3	FP474.5		T-815	TVL-4832
B	■10	475						MT-4710	
C	▲10	475							
D	25	50							

FIXED CAPACITORS

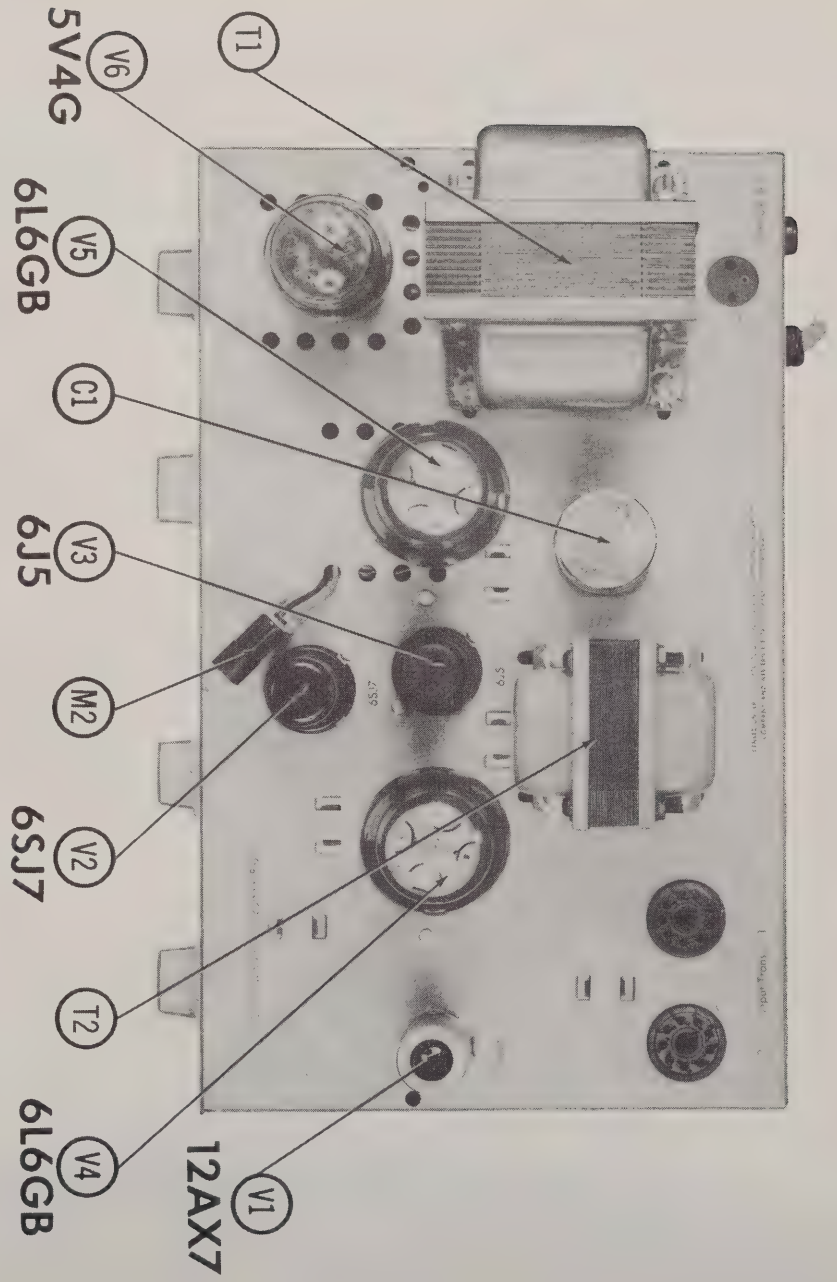
Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	NEWCOMB PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C2	.022	600	CP-47	P688N-022	DD-203	CUB6S22	ED-02	GEM-6122	6TM-S22	
C3	.022	600	CP-47	P688N-022	DD-203	CUB6S22	ED-02	GEM-6122	6TM-S22	
C4	.022	600	CP-47	P688N-022	DD-203	CUB6S22	ED-02	GEM-6122	6TM-S22	
C5	.022	600	CP-47	P688N-022	DD-203	CUB6S22	ED-02	GEM-6122	6TM-S22	
C6	10000		CM-32	BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C7	.25	600	CP-53	P688N-25		CUB6P25		GEM-6025	6TM-P25	
C8	350		CM-26		DD-351	L10T35			5GA-T35	
C9	.022	600	CP-47	P688N-022	DD-203	CUB6S22	ED-02	GEM-6122	6TM-S22	
C10	.1	400	CP-51	P488N-1	DF-104	CUB4P1		GEM-401	4TM-P1	
C11	.0022	600	CP-48	P688N-0022	D6-222	CUB6D22	GP-2200	GEM-6222	6TM-D22	
C12	.047	600	CP-49	P688N-047	DF-503	CUB6S47		GEM-6147	6TM-S47	
C13	.047	600	CP-49	P688N-047	DF-503	CUB6S47		GEM-6147	6TM-S47	
C14	.047	600	CP-49	P688N-047	DF-503	CUB6S47		GEM-6147	6TM-S47	

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	NEWCOMB PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	2Meg	½	RV-49-K	B-77		Q17-139		Treble
B	Shaft			Not Req.		Not Req.		
C	Switch			KB-1		76-1		
R2	15Meg	½	RV-40-K					Bass
R3	2 Meg	½	RV-62-K					Phono-Mike 1, Tap ⓐ 700K & 1Meg
R4A	500K	½	RV-41-K	B-60	A47-500K-Z	Q13-133	U48	Mike 2
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	NEWCOMB PART No.	IRC PART No.	
R5	18Meg		RR-140	BTS-18Meg	
R6	560K		RR-34	BTS-560K	
R7	56K		RR-25	BTS-56K	
R8	18Meg		RR-140	BTS-18Meg	
R9	560K		RR-34	BTS-560K	
R10	10Meg		RR-46	BTS-10Meg	
R11	56K		RR-25	BTS-56K	
R12	1Meg		RR-37	BTS-1Meg	
R13	330K		RR-32	BTS-330K	
R14	330K		RR-32	BTS-330K	
R15	560K		RR-34	BTS-560K	
R16	3.3Meg		RR-42	BTS-3.3Meg	
R17	100Ω		RR-1	BTS-100	
R18	560K		RR-34	BTS-560K	
R19	100K		RR-27	BTS-100K	
R20	5600Ω		RR-15	BTS-5600	
R21	100K		RR-27	BTS-100K	
R22	270K		RR-31	BTS-270K	
R23	270K		RR-31	BTS-270K	
R24	250Ω	5	RR-94		
R25	4700Ω	2	RR-147	BTB-4700	
R26	56K		RR-25	BTS-56K	
R27	100K		RR-27	BTS-100K	

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	NEWCOMB PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC @ .9A	720VCT @ .122A	5VAC @ 3A	6.3VCT @ 2.8A	TR-118	P9316	P-3173 ①	PC8411	24R06U	R-14A ①

① Drill new mounting hole.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	NEWCOMB PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	5200Ω	500Ω tap @ 70V, 16Ω, 8Ω, 4Ω	TR-188				22S70 ①		① Use 250Ω tap for 70V tap.

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			NEWCOMB PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG	1 6/10A 125V S/B	FA-19		31301.6 (3AG 1 6/10A 125V S/B)	341001	MDL 1 6/10	HKP

MISCELLANEOUS

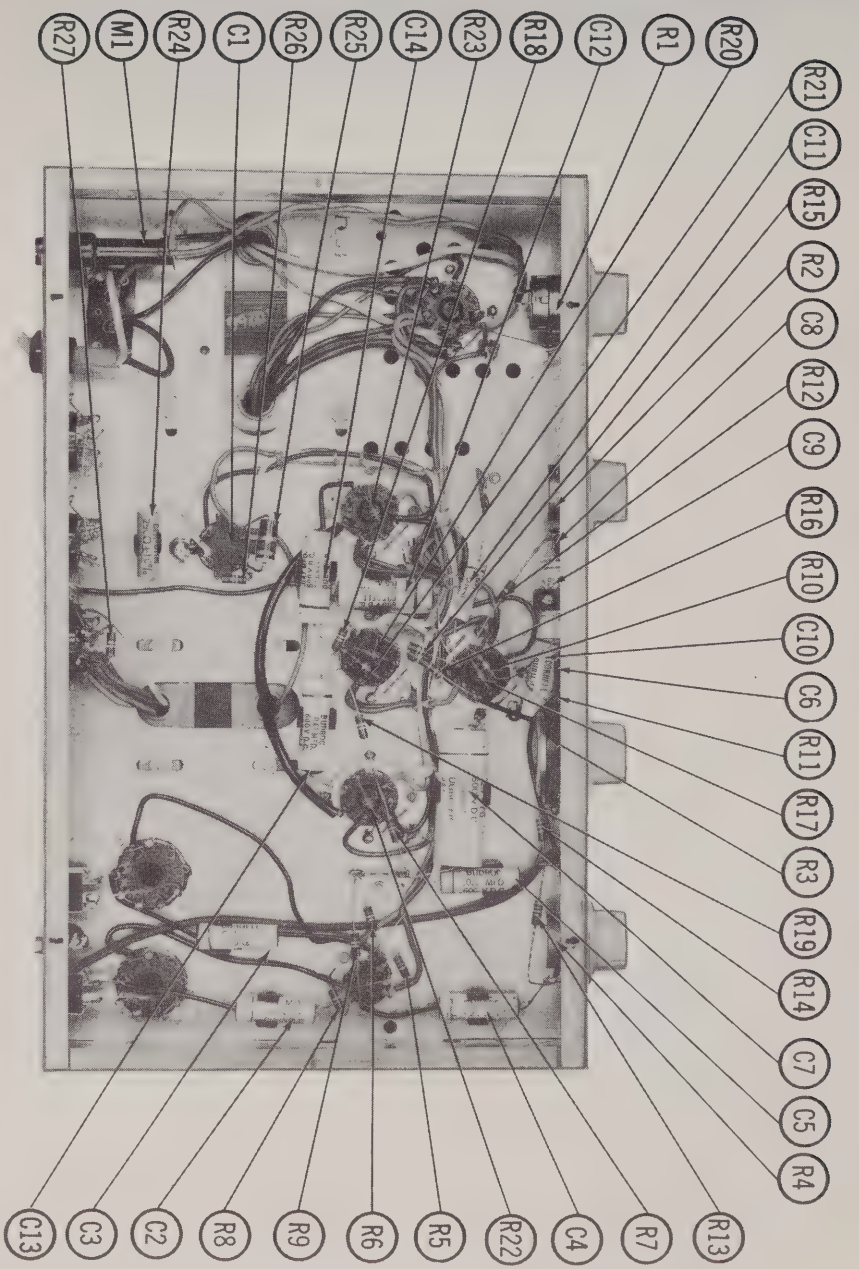
ITEM No.	PART NAME	NEWCOMB PART No.	NOTES
M2	Pilot Lamp	DL-5	#51

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	KA-15-K	4 used

CHASSIS—BOTTOM VIEW

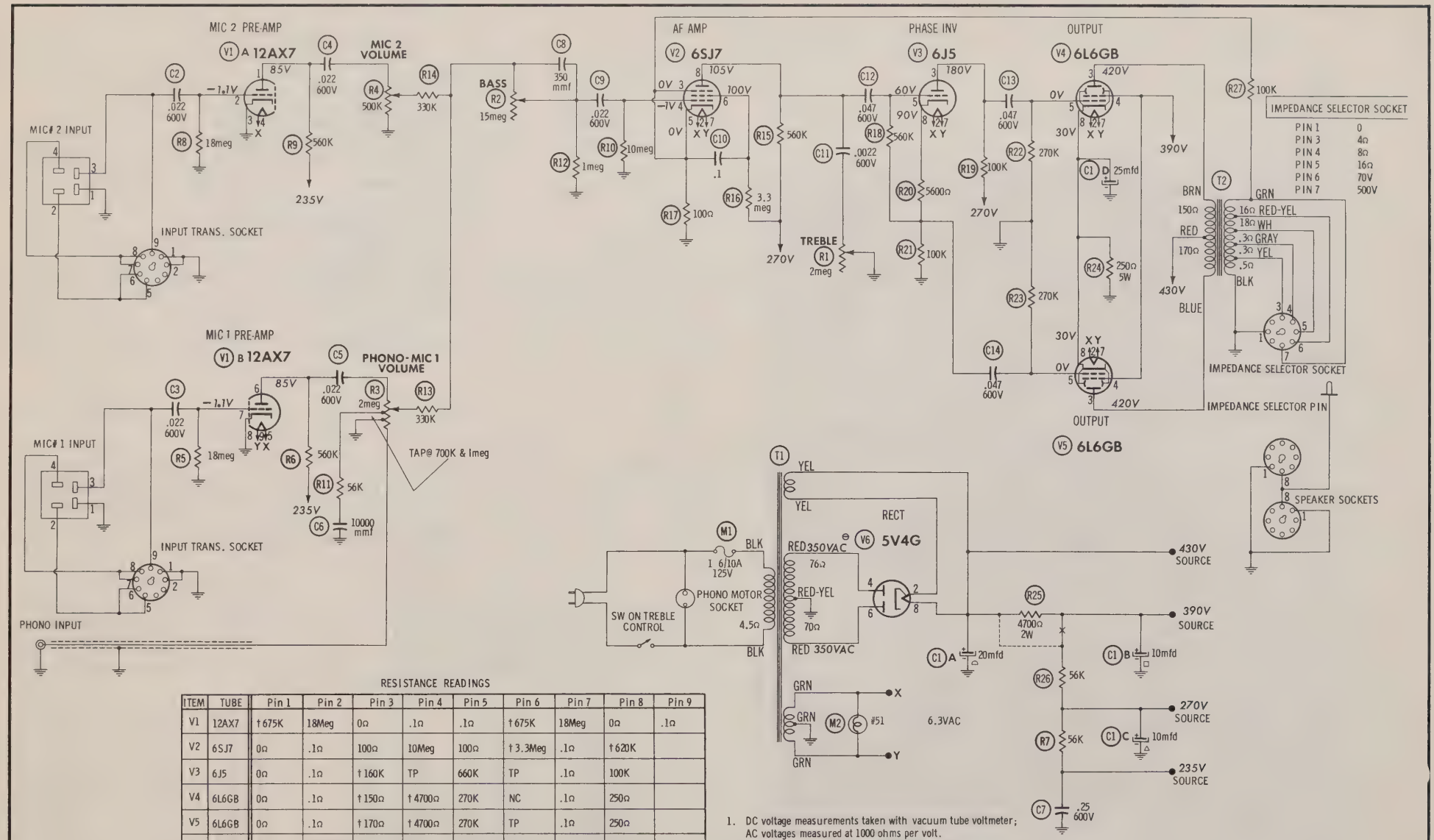


SET 379 FOLDER 11

FOLDER 11

NEWCOMB MODEL E-25

NEWCOMB MODEL E-25



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12AX7	†675K	18Meg	0Ω	.1Ω	.1Ω	†675K	18Meg	0Ω	.1Ω
V2	6SJ7	0Ω	.1Ω	100Ω	10Meg	100Ω	†3.3Meg	.1Ω	†620K	
V3	6J5	0Ω	.1Ω	†160K	TP	660K	TP	.1Ω	100K	
V4	6L6GB	0Ω	.1Ω	†150Ω	†4700Ω	270K	NC	.1Ω	250Ω	
V5	6L6GB	0Ω	.1Ω	†170Ω	†4700Ω	270K	TP	.1Ω	250Ω	
V6	5V4G	0Ω	20K(Min)	TP	76Ω	TP	70Ω	NC	20K(Min)	

† MEASURED FROM PIN 8 OF V6.
NC NO CONNECTION
TP TIE POINT

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance of component values makes possible a variation of ±15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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PHOTOFACT* Folder

*TRADE MARK

RETMA MEMBER RADIO-ELECTRONICS-TELEVISION MANUFACTURERS ASSOCIATION

SILVERTONE
MODEL 6074 (Ch. 567.34004, 567.35005)

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

SILVERTONE
MODEL 6074 (Ch. 567.34004, 567.35005)

SILVERTONE
MODEL 6074 (Ch. 567.34004, 567.35005)

GENERAL INFORMATION

The Silvertone Model 6074 Tape Recorder is designed to record and playback two tracks of material on standard width recording tape. This doubles the recording and playing time with no loss of frequency response or quality. Recordings can be made from a radio, phonograph or television receiver, in addition to those made directly from the microphone.

The Model 6074 has simple controls and a meter type volume level indicator. Markings on the meter show the proper volume level for recording.

The Model 6074 has two tape speeds, 3 3/4" and 7 1/2" per second. Using both tracks of the tape, the recording times are as follows:

Reel Size	3 3/4" Speed	7 1/2" Speed
5" (600 ft.)	1 hour	1/2 hour
7" (1200 ft.)	2 hours	1 hour
7" (1800 ft.)	3 hours	1 1/2 hours

This unit is designed to operate on 115V, 60 cy. AC only. Before connecting to a power source make absolutely certain that it agrees with the above specifications.

SUPPLIED BY:

SEARS ROEBUCK AND CO.
925 S. HOMAN STREET
CHICAGO 7, ILLINOIS

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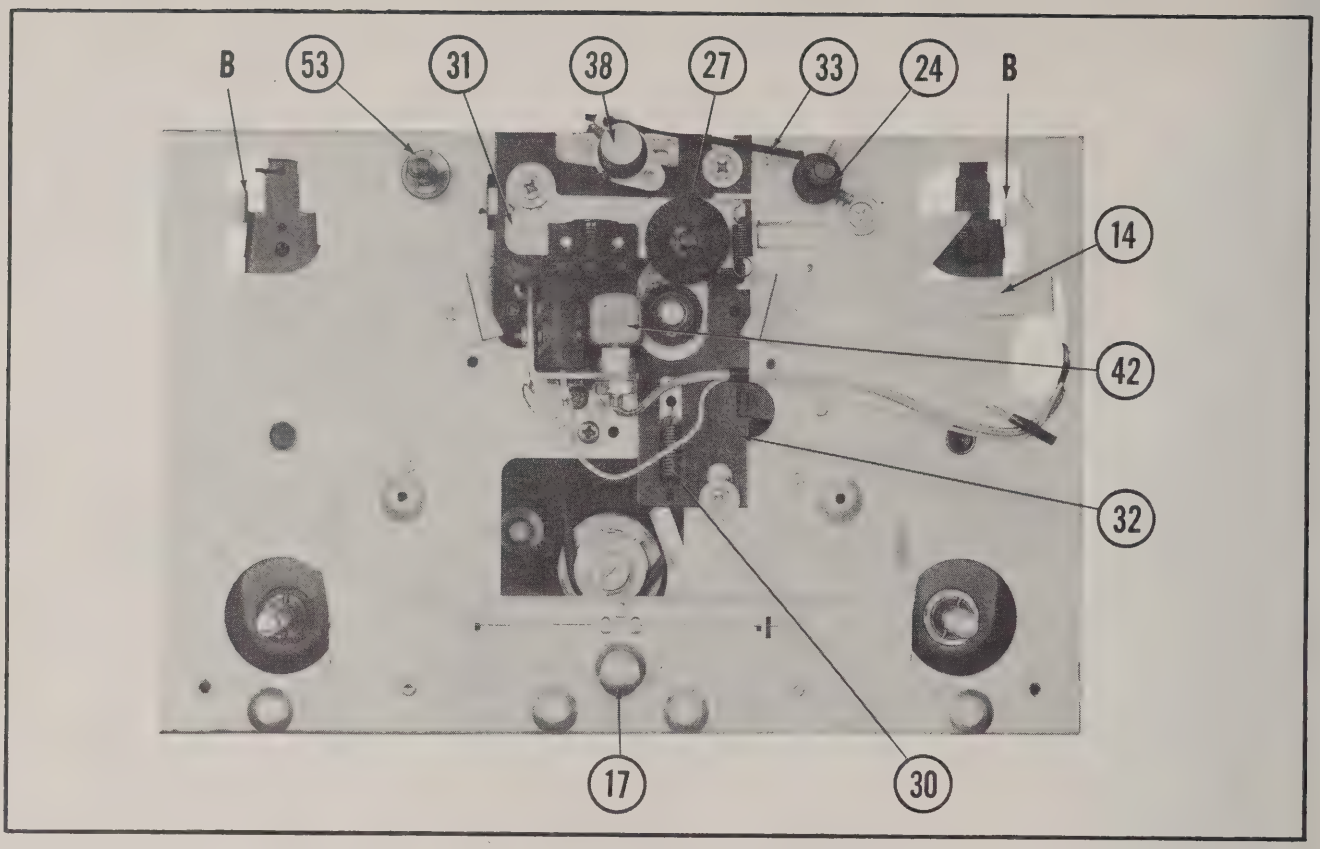

FIGURE 1

RECORDER PREPARATION

Preparation For Operation:

1. Open the cover of the recorder and remove the power cord, microphone, empty reel and reel of tape from the storage compartment at the rear of the set.

2. Plug the power cord into any AC outlet that meets the frequency and power requirements.

3. Remove the cover and place the unit with the controls accessible and at a convenient height.

4. The tape recorder is now ready for use. Before using the unit become thoroughly familiar with the operating controls.

FUNCTION OF CONTROLS

Tape Drive Control:

The knob to the right of the "Volume" control operates the tape drive mechanism of the unit for both playback and record.

The knob has two positions — idle and playback. At the left (counter-clockwise) position the unit is in "Idle" and will neither record nor playback. At the right (clockwise) position the control has set the mechanism in drive position, either for playback or record.

On-Off-Volume Control:

The left hand knob on the control panel operates the power switch to the motor and amplifier as well as controlling the volume on both playback and record. Turning the knob to the right (clockwise) increases the volume and turning to the left decreases the volume.

Lock Control:

The small metal knob behind the recording level meter controls the amplifier circuits for playback or record. This knob is used with the tape drive control. When the lock knob is in the up position the amplifier circuits are set for playback. When the tape drive control is turned to the right the tape will move through the mechanism and any sound previously recorded on the tape will be reproduced.

Pushing the lock control down switches the amplifier to record. Holding the lock control down, when the tape drive control is rotated to the right, will lock the unit in record position. The tape will pass through the mechanism and the unit will record.

Hi Speed Wind-Rewind Control:

The knob to the right of the lock control operates the high speed wind and rewind mechanism of the recorder. With the tape drive control in "Idle" position, movement of the "Wind-Rewind" knob will wind or rewind the tape at a high rate of speed. Several minutes of normal playing can be by-passed in a few seconds with this control.

Tone Control:

The knob on the right hand side of the control panel operates the motor power switch, acts as a monitor volume control during recording, in addition to regulating tone during playback.

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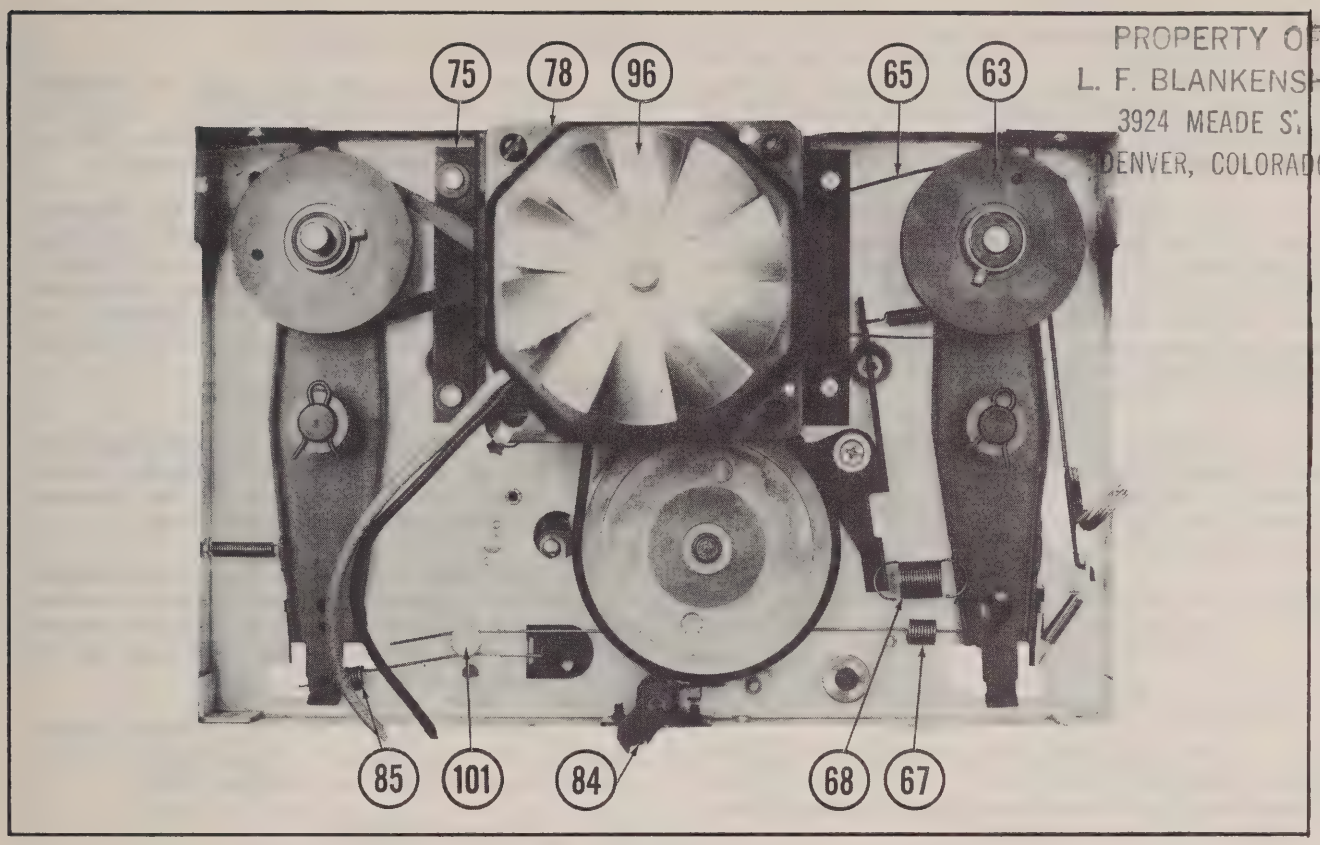

FIGURE 2

The motor is turned on by rotating the control clockwise (right) from the extreme left position. The amplifier must be on before the motor will run.

To regulate monitor volume during recording, rotate the knob as far counter-clockwise as it will go without turning the motor off, then rotating slowly clockwise until the desired monitoring level is reached.

Speed Control:

Changing speed is accomplished by placing the speed button in the "Up" or "Down" position. Up for 3 3/4" per second or down for 7 1/2" per second.

CAUTION: Do not attempt to operate the speed change button unless the motor is running.

OPERATING INSTRUCTIONS

Threading The Tape:

1. Place a reel of tape on the right reel plate and an empty reel on the left hand reel plate, making sure the reel slots engage the protrusions on the reel plates.

2. Unwind about 14" of tape from the full reel. Hold a section of the tape straight between the hands with the dull coated side facing the rear of the recorder, and insert the tape in the tape slot.

3. Insert the free end of the tape into one of the three radial slots in the hub of the empty reel. Turn the reel clockwise several times until the tape is secured to the reel and all slack is taken up between reels.

To Record From Microphone:

1. Turn the "On-Off-Volume" control (5) clockwise until a click is heard and allow about thirty seconds for the unit to warm up.

2. Insert the microphone plug into the "Mike" jack.

3. Make certain the tone control and motor switch is in the "Off" position. Push down and hold the lock knob, and turn the "Tape Drive" knob until both knobs lock in place.

4. While speaking into the microphone in a normal voice, turn the "Volume" control knob clockwise until the recording level meter needle fluctuates only within the "Normal" range. For voice recordings hold the microphone from six to twelve inches from the mouth.

5. Turn the "Tone" control clockwise until the motor turns on, then adjust the monitor volume level. Adjust the speed control for the desired speed.

NOTE: Correct recording level is extremely important. Too weak a signal, which does not cause the meter needle to fluctuate will result in weak playback and high background noise. Too strong a signal which drives the needle above the "Normal" range will result in distortion.

To Record From Radio:

Recordings from a radio may be made from one of three methods.

1. Place the microphone about 6" to 12" in front of the radio speaker. Turn the radio on and set the volume control to normal level. Too high a setting will cause distortion. Turn the radio tone control to maximum treble. Set the recording level and proceed as described under "To Record From Microphone".

2. Make up a shielded patch cord using a two conductor phone plug on one end and two alligator clips on the other end. Connect the alligator clips across the voice coil terminals of the radio speaker and insert the phone plug in the "Radio" jack. Set the radio tone and volume controls as described above. Set the recording level, and proceed as described under "To Record From Microphone".

3. Using a shielded patch cord as described above, connect the two alligator clips across the volume control of the radio. Insert the phone plug into the "Radio" jack. Set the recording level and proceed as described under "To Record From Microphone".

NOTE: The position of the radio volume and tone controls have no effect on this method and may be set any place.

To Record From Phonograph:

1. If the phonograph being used has a phone type plug on the pickup leads, insert it in the "Radio" jack. Set the recording level and proceed as described under "To Record From Microphone".

2. If the phonograph has a standard pin type plug, which is more common, an adaptor is required. Insert the pin plug into the adaptor and insert the adaptor in the "Radio" jack.

To Record From TV Receiver:

1. Use one of the three methods described under "To Record From Radio" and proceed as described under "To Record From Microphone".

Dual Track Recording:

1. When a reel of tape has been recorded, i.e. all of the tape wound on the take-up reel, turn the "Tape Drive" control to "Idle".

2. Remove the reels from the recorder. Turn the full reel over and place it on the right hand (feed) spindle. Place the empty reel on the left hand (take-up) spindle.

3. Thread the tape properly and proceed with the recording.

4. When the second track has been recorded the first track is ready to be played without rewinding. Simply reverse the reels as described in step 2 above.

To Play A Recording:

1. Thread the tape as described under "Threading The Tape".

2. Turn the "Tape Drive" control clockwise without pressing the "Lock" button.

3. Adjust the volume and tone controls for desired listening levels.

To Use An External Speaker:

Connect the speaker cable with the alligator clips to the desired external speaker. Insert the phone plug into the "External Speaker" jack. The recorder now plays through the external speaker.

CAUTION: Never insert a plug into the "External Speaker" jack without a speaker attached. Inserting the plug disconnects the built in speakers and, unless a speaker is attached to the plug, can result in damage to the output transformer, tube, and tone control.

To Edit And Splice Tape:

NOTE: It is impossible to edit and splice one track without affecting the other track. Consequently recordings which are to be edited should be limited to one track only.

1. Tape may be edited by cutting out unwanted sections, or by joining selections together in another sequence. Announcements may be inserted between selections, etc. Unused sections of tape may be spliced together for reuse.

2. For best splicing results cut tape at a slight diagonal, join ends together with splicing tape on the glossy side and trim off any excessive width.

Erasing Recorded Material:

In the record position any recording on a tape is automatically erased before the new recording is placed on the tape. When it is desired to erase a recording without recording new material, proceed to record in the normal manner, except turn the volume control to the extreme counter-clockwise position.

To Use As A Public Address System:

1. Insert the microphone plug into the "Radio" jack.

2. Leave the "Tape Drive" control in idle position.

3. Speak into the microphone and adjust the "Volume" and "Tone" controls for desired listening level.

4. Do not get the microphone too close to the speaker or a feedback howl will result.

ADJUSTMENTS

1. All service work except cleaning and adjustments of the heads and pressure roller and pressure pad assembly requires removal of the unit from the carrying case.

2. To remove unit from the carrying case, remove two wood screws from the control panel escutcheon plate and four screws from the bottom of the carrying case. Lift the unit carefully straight up and out of the case.

Spindle End Play Adjustment:

The spindles (11) should have from 1/32" to 1/16" of up and down movement. Loosen the set screw in the pulley (64) and move pulley up or down until the

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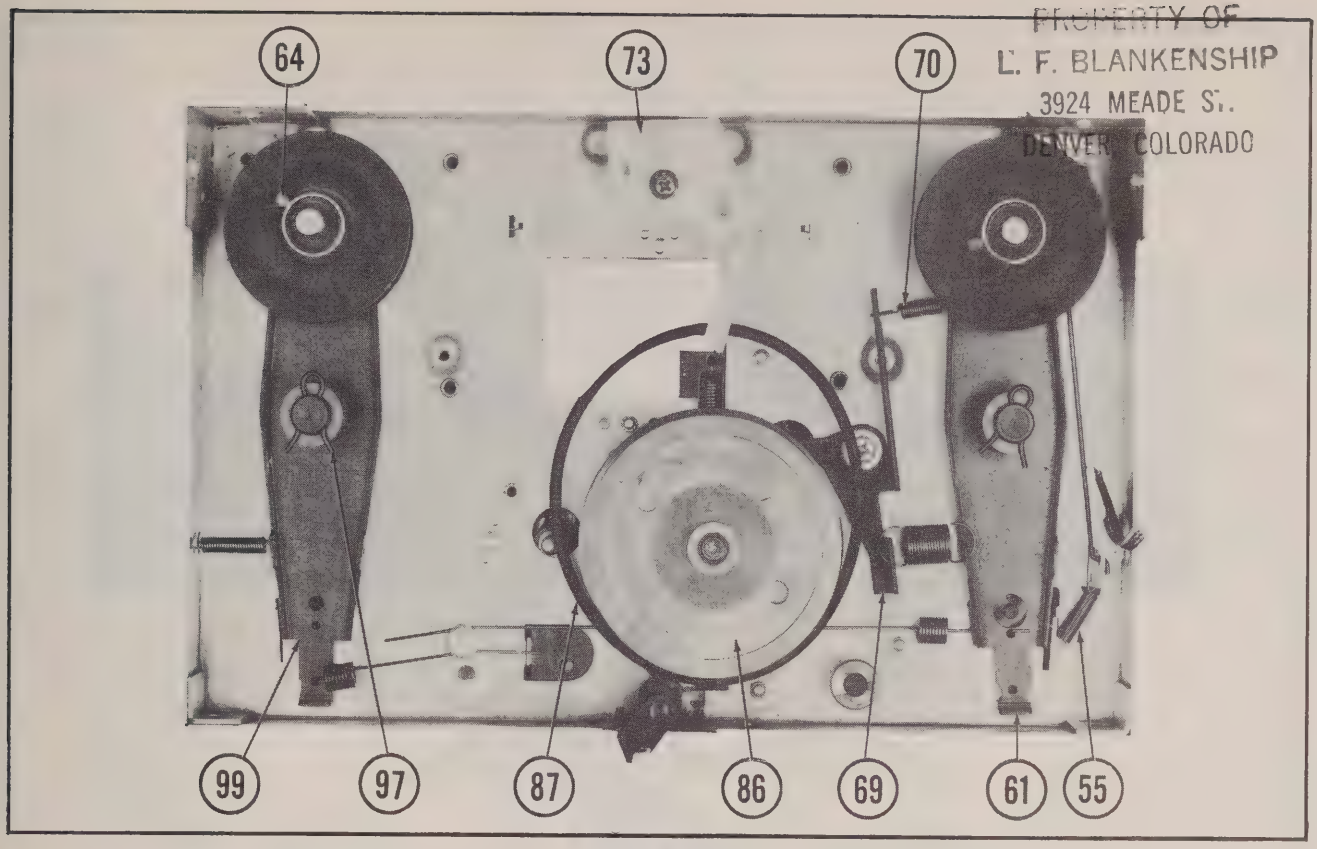


FIGURE 3

correct amount of end play is present.

Take-Up And Feed Reel Drag Adjustment:

When the "Tape Drive" control is turned to the idle position the reels should stop right away to prevent looping of the tape. Also, when releasing the fast forward or fast rewind control the tape should rapidly stop without looping or spilling the tape. The stop arm on the motorboard (point "B" on exploded view) that the feed reel and take-up reel arms rest against when the tape is not moving, is what governs this. The stop arms should be bent to cause sufficient drag to be placed on the belts for the spindles to just revolve without the reels in place, but not sufficient drag to turn the spindles with the reel in place. The adjustment is made with the "Tape Drive" control in idle position.

Play-Record Head Adjustment:

It is very important that the record head (42) be lined up perfectly with the tape. If it is not, loss of high frequencies, low output or track overlap may result.

1. To adjust for output and frequency response, a tape on which a 3000 cycle note has been recorded by a unit known to be in good operating condition, will be required. Connect an output meter or an AC voltmeter across the speaker voice coil of the unit to be adjusted. While playing back the 3000 cycle note tape, move head back and forth on mounting until maximum amplitude on output meter is reached.

2. If a 3000 cycle note tape cannot be made, use a recording with high note content to make the above adjustment.

3. To test for track overlap record one track of the tape, then turn the tape over and play back the second track, on which no recording is made. If any sound is heard track overlap is present and the head must be adjusted.

Erase Head Adjustment:

The erase head (46) and bracket (45) has been aligned at the factory and no adjustment has been provided. To replace the erase head it is necessary to remove the "Play-Record" head. After installation it is necessary to realign the "Play-Record" head as outlined under "Play-Record Head Adjustment".

Amplifier Adjustments:

The following adjustments should be made whenever circuit components are replaced or repaired in the amplifier. These adjustments must be made with the set turned on and in "Record" position with no signal applied.

1. Adjust "Oscillator Coil" adjustment (L2) for minimum reading across load at "external speaker" jack with volume and tone controls set at maximum.

2. Adjust "Meter" adjustment (R3) to point where needle on the meter rests directly over the black dot on the left side of the meter. With (R3) properly adjusted there should be a slight movement of the needle when the set is turned off and on.

3. To adjust "50KC Trap" the volume must be set at maximum. Adjust (L1) for minimum 50KC reading at "external amplifier" jack.

4. Set "Hum Adjust" (R4) for minimum reading

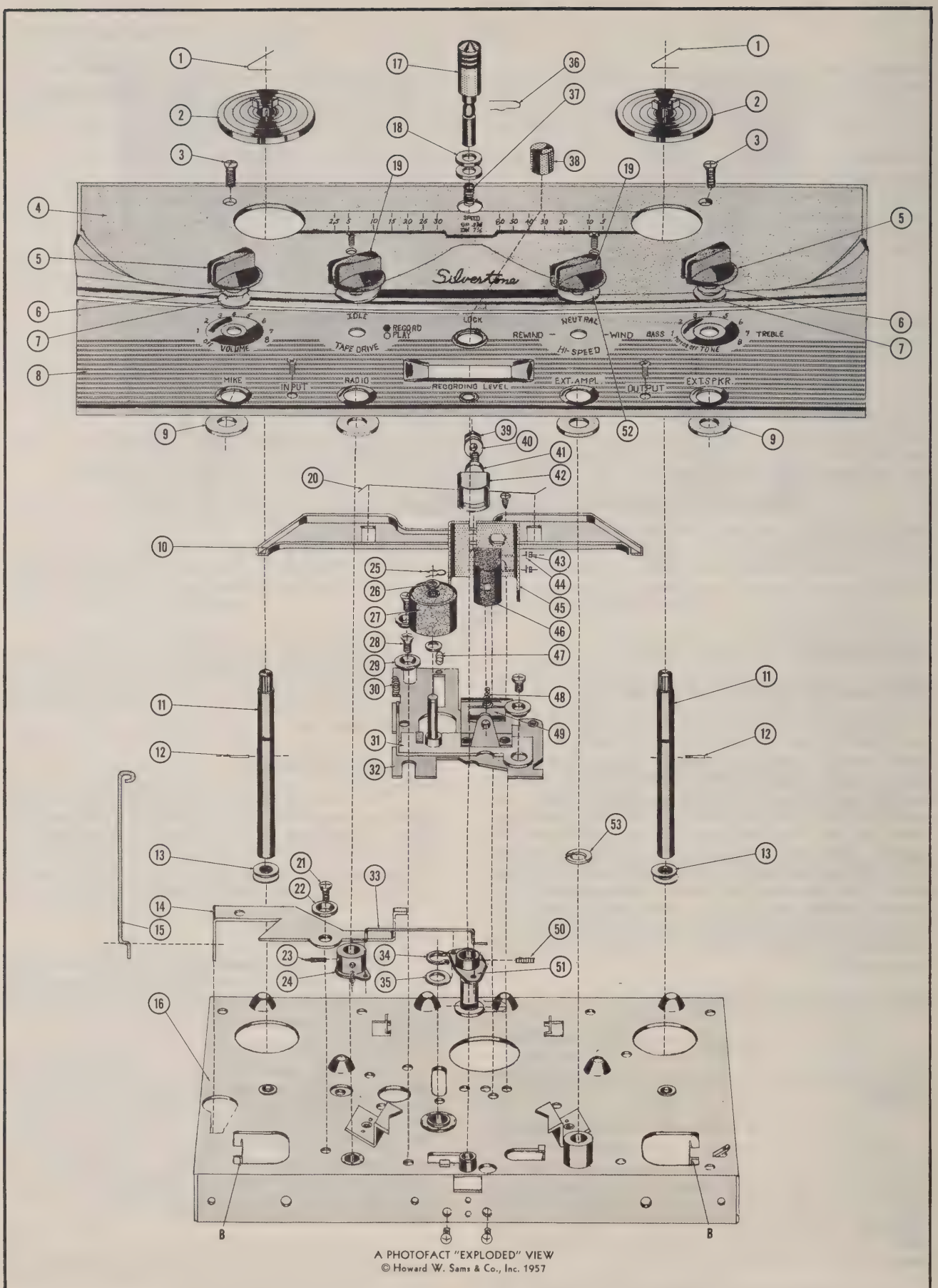


FIGURE 4A - EXPLODED VIEW OF PARTS ABOVE THE BASEPLATE.

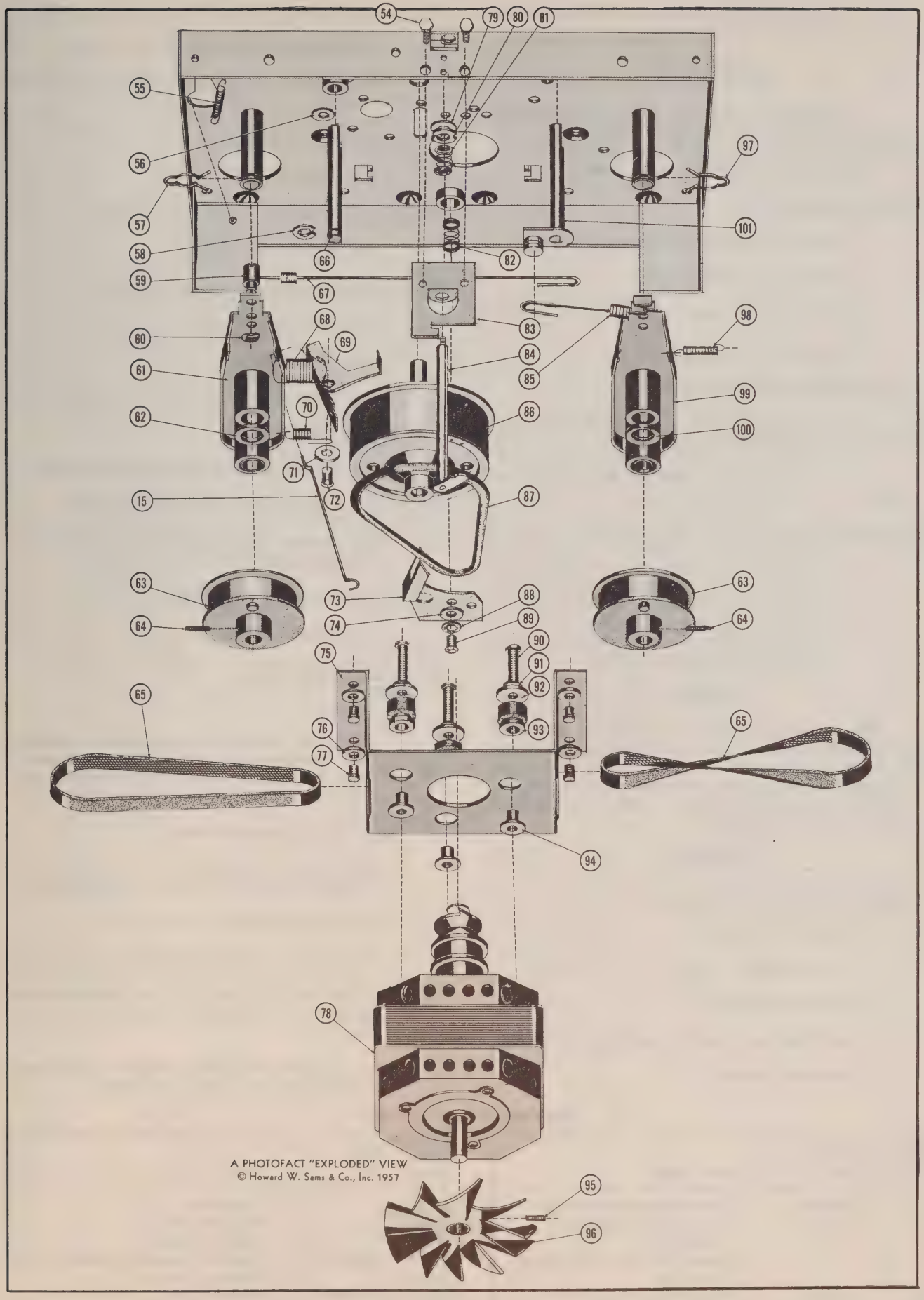


FIGURE 4B - EXPLODED VIEW OF PARTS BELOW THE BASEPLATE.

across load at "external speaker" jack with volume and tone controls set at maximum.

LUBRICATION

The lubricants applied at time of manufacture should be sufficient for a long period of time. Approximately once a year, or in the event that parts are replaced, lubricate the unit as follows:

With No. 20 Motor Oil:

1. Take-up reel arm (61) bushing.
2. Feed reel arm (99) bushing.
3. Spindle (11) bearings.
4. Flywheel (86) bearing.

With Staput #312 Grease Or Lubriplate:

1. Pressure plate (32) at the slide button and the guide on the right side.

2. On the stud of the cam and bushing (51) assembly.

CAUTION: Do not oil the motor bearings unless absolutely necessary as excess oil will only be thrown off and cause slipping of the pulleys, rollers, and belts. Always use as little oil as possible. If oil should get on the pulleys and rollers wipe off with a petroleum solvent, such as alcohol. Do not use carbon-tetrachloride.

CLEANING

The record and erase heads, capstan shaft (86), and pressure roller (27) are subject to an accumulation of tape coating residue, which is worn off the tape as it passes these parts. This can cause distortion, weak output, and poor erasure. Use a soft cloth and alcohol to clean these parts.

TROUBLES

Will Not Take Up Tape Properly:

1. Spindle (11) binding.
   (a) Lubricate.
2. Belt (65) slipping.
   (a) Clean motor pulley and drive pulley (63).
3. Belt (65) broken.
   (a) Remove bracket (75) and replace belt.
4. Set screw loose in take-up pulley (64).
   (a) Tighten set screw leaving 1/32" to 1/16" end play in spindle.
5. Pulley (65) broken.
   (a) Replace pulley.

Fast Forward Does Not Function Properly:

1. See above except step 2.

Fast Rewind Does Not Function Properly:

1. Spindles (11) binding.
2. Belt (65) slipping.
   (a) Clean motor pulley and drive pulley (63).
3. Belt (65) broken.
   (a) Remove bracket (75) and replace belt.
4. Set screw loose in rewind pulley (64).
   (a) Tighten set screw leaving 1/32" to 1/16" and play in spindle.
5. Rewind pulley broken (63).
   (a) Replace pulley.

Speed Variation Or WOW:

1. Slippage
   (a) Clean motor pulley, flywheel, capstan (86), and pressure roller (27), with a petroleum solvent, not carbon-tetrachloride. Replace the rubber roller if it is oil soaked.
2. Too much feed reel drag.
   (a) Check adjustments as described under "Take-Up And Feed Reel Drag Adjustment".
3. Flat spot on pressure roller (27).
   (a) A rapid thumping sound while the unit is running may indicate a flat spot on the pressure roller. If this condition does not clear up after several minutes of running, replace the roller.
   (b) If the surface of the rubber roller is not smooth and even, replace the part.

MECHANICAL PARTS LIST

Ref. No.	Part No.	Description
1	Y460165	Reel Holder Retainer (2)
2	Y012468	Feed and Take-Up Reel Holder (2)
3		Plastic Top Plate Mounting Screw (4)
4	Y012501	Plastic Top Plate
5	Y310311	Volume and Tone Control Knob (2)
6		Nut, Mounting
7		Washer, Steel
8	Y012678	Control Panel Escutcheon Plate
9		Washer, Fibre
10	Y100880	Brake Plate
11	Y011319	Feed and Take-Up Spindle (2)

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 100 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance of component values makes possible a variation of ±5% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12AU7A	↑ 180K	470K	4700Ω	68Ω	68Ω	↑ 180K	1Meg	4700Ω	68Ω
V2	12AX7	↑ 115K	0Ω	1500Ω	68Ω	68Ω	↑ 235K	220K	2700Ω	68Ω
V3	12AU7A	↑ 50K	600K	■ 0Ω	68Ω	68Ω	↑ 1000Ω	47K	■ 0Ω	68Ω
V4	6V6GT	TP	68Ω	↑ 1400Ω	↑ 1000Ω	420K	NC	68Ω	■ 700Ω	250Ω
V5	6X5GT	TP	68Ω	450Ω	NC	420Ω	NC	68Ω		110K

ALL MEASUREMENTS TAKEN IN "PLAY" POSITION UNLESS OTHERWISE DESIGNATED.
NR = READS IN "RECORD" POSITION
TP TIE POINT
NC NO CONNECTION.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
Howard W. Sams & Co., Inc. 1957

379-12

FOLDER 12

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	Preamplifier	12AU7A	
V2	AF Amplifier	12AX7	
V3	Meter Amp. - Bias Osc.	12AU7A	

ITEM No.	USE	TYPE	NOTES
V4	Output	6V6GT	
V5	Rectifier	6X5GT	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	SILVERTONE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	▲40	300		AFH4-02	DO020	FP217.87	TMT-23	D-130	R1898*
B	■40	300	770088			TC78		MT-4540	
C	▲40	300							
C2	25	25	770003	PRS25V25	BBR25-25	TC26	TD-25-25	FM-0225	TVA-1205

* Non-catalog item.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	SILVERTONE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C3	20000		Y770095	BPD-02	DD-203	BYB6S2	ED-02		5HK-S2	
C4	20000		Y770095	BPD-02	DD-203	BYB6S2	ED-02		5HK-S2	
C5	75		Y770097	NPO-DI75	D6-750	L10Q75	ED-75			10%
C6	2000	1000	Y770110							10%
C7	20000		Y770095	BPD-02	DD-203	BYB6S2	ED-02		5HK-S2	
C8	20000		Y770095	BPD-02	DD-203	BYB6S2	ED-02		5HK-S2	
C9	1000		Y770123				ED-1000			10%
C10	470		Y770090		D6-471	L10T47	ED-470			10%
C11	1500		Y770098							10%
C12	470		Y770090		D6-471	L10T47	ED-470			10%
C13	470		Y770090		D6-471	L10T47	ED-470			10%
C14	1500			1464-0015		1R5D15			MS-215	10%
C15	1000	1000	Y770140	DAC-2	DD-102	BYA10D1	HD15-1000	DC3021	5HK-D1	
C16	470		Y770090	BPD-00047	DD-471	BYA10T47	ED-470	UC-5347	5GA-T47	
C17	1000	1000	Y770140	DAC-2	DD-102	BYA10D1	HD15-1000	DC3021	5HK-D1	
C18	.01	1500	Y770105	DAC-27	DD16-103	HVE16S1		GEM-1611	BL-S10	
C19	.01	1500	Y770105	DAC-27	DD16-103	HVE16S1		GEM-1611	BL-S10	

CONTROLS

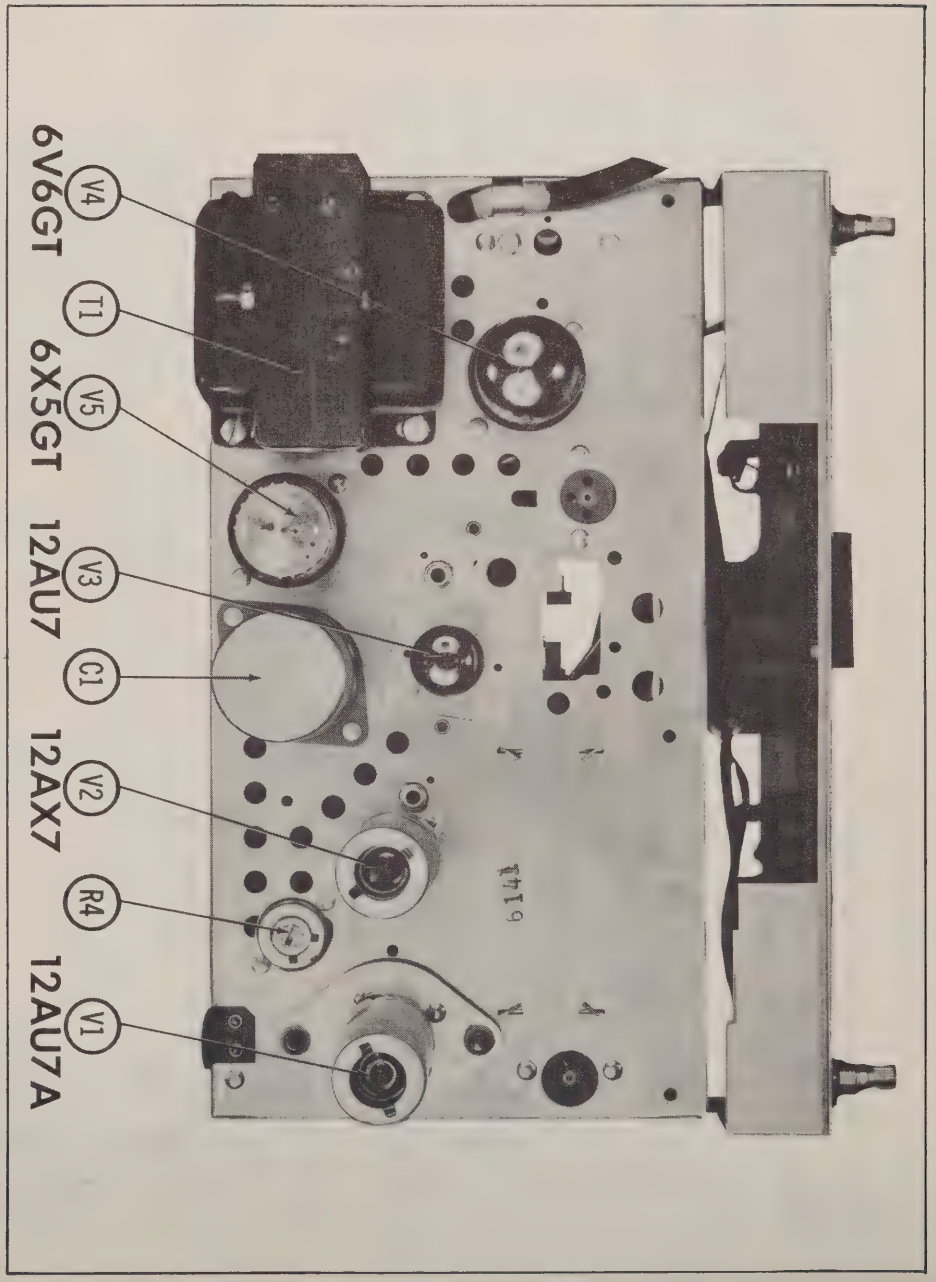
ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	SILVERTONE PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	500K	½	Y740078	B-60	A47-500K-Z	Q13-133	U48	Volume
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	
C	Switch			KB-1	SWE-12	76-1	US-26	
R2A	500K	½	Y740052	B-60	A47-500K-Z	Q13-133	U48	Tone
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	
C	Switch			KB-1	SWE-12	76-1	US-26	
R3A	50K	½	Y740079	BX-31				Meter Adjust
B	Shaft			Not Req.				
R4	200Ω	2	Y740045					Hum Balance Wire Wound

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA				NOTES
		SILVERTONE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	50KC Trap	Y700066	6315			
L2	Bias Oscillator	Y700088 *				Tapped @ 4.6Ω

* Includes C10.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	SILVERTONE PART No.	IRC PART No.	
R5	1Meg		Y760001	BTS-1Meg	
R6	470K		Y760037	BTS-470K	
R7	220K		Y760036	BTS-220K	
R8	4700Ω		Y760073	BTS-4700	
R9	470K		Y760037	BTS-470K	
R10	220K		Y760036	BTS-220K	
R11	4700Ω		Y760073	BTS-4700	
R12	150K		Y760008	BTS-150K	
R13	100K		Y760060	BTS-100K	
R14	1500Ω		Y760003	BTS-1500	
R15	220K		Y760036	BTS-220K	
R16	220K		Y760036	BTS-220K	
R17	15K		Y760027	BTS-15K	
R18	2200Ω		Y760068	BTS-2200	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	SILVERTONE PART No.	IRC PART No.	
R19	1Meg		Y760001	BTS-1Meg	
R20	1Meg		Y760001	BTS-1Meg	
R21	470K		Y760037	BTS-470K	
R22	100K		Y760077	BTS-100K 5%	Note 1
R23	62K 5%		Y760079	BTS-62K 5%	
R24	47K		Y760013	BTS-47K	
R25	220K		Y760036	BTS-220K	
R26	68K		Y760057	BTS-68K	
R27	470K		Y760037	BTS-470K	
R28	10K		Y760019	BTS-10K	
R29	560Ω	1	Y760105	BTA-560	
R30	270Ω	1	Y760115	BTA-270	
R31	1000Ω	10	Y760401	PW10-1000	

Note 1. Supplier recommends 5% replacement.

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	SILVERTONE PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC @ .34A	525VCT @ .044A	6.3V @ 2.15A		700089	P9203 ① ② ④	P-3047 ④	PM8402 ① ② ④	22R01 ① ② ③	R-8B ① ② ④

① Tape 5V Filament Winding.
② Tape Center Tap On 6.3V Filament Winding.
③ Use Mounting Brackets.
④ Fabricate Mtg.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	SILVERTONE PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	5000Ω	3-4Ω tap @ 2Ω	700071						

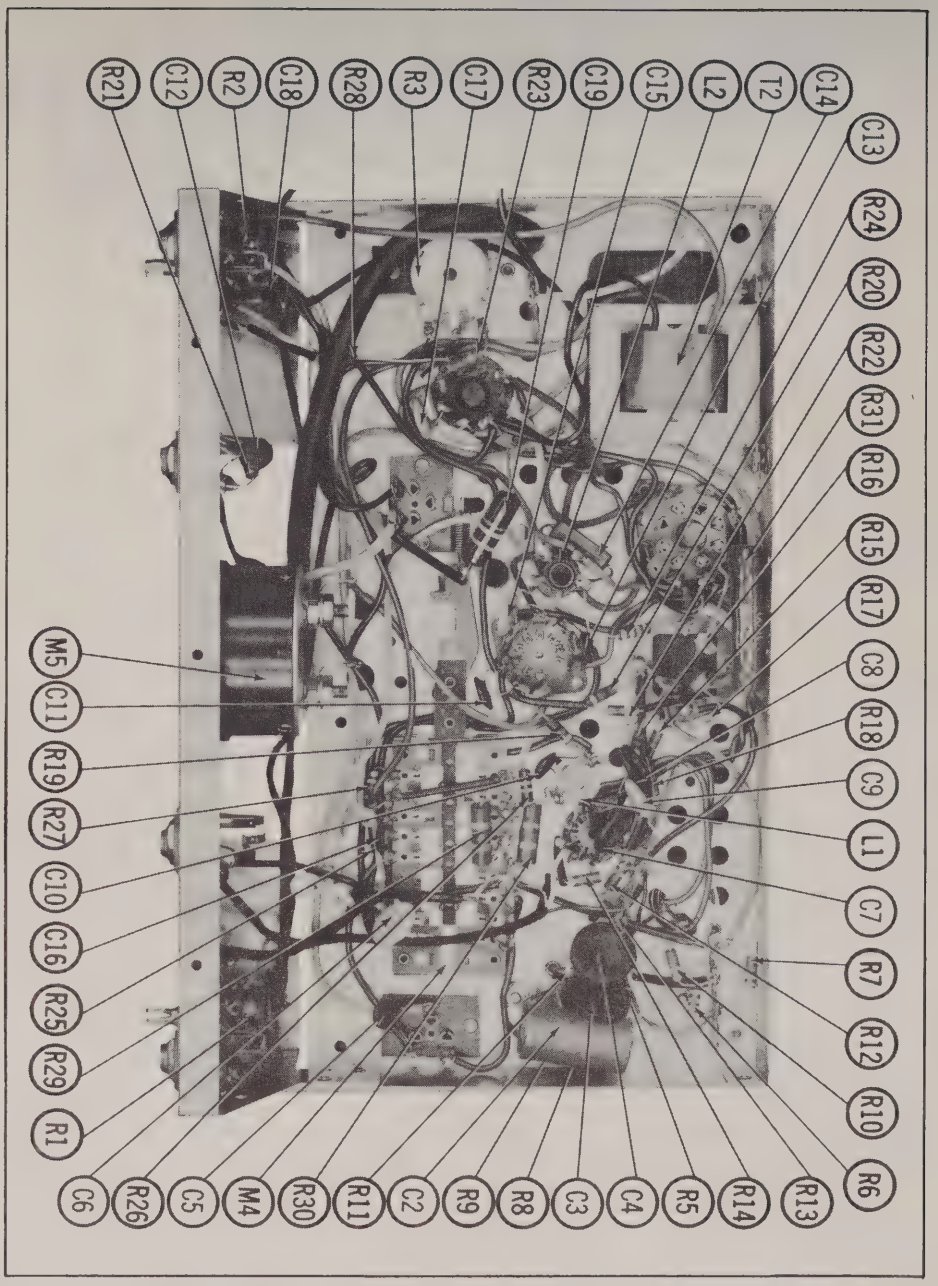
SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	SILVERTONE PART No.	QUAM PART No.	
SP1	6"	PM	3-4Ω	011701 ①	6A15 ①	① Connect in parallel & phase.
SP2	6"	PM	3-4Ω	011701 ①	6A15 ①	

MISCELLANEOUS

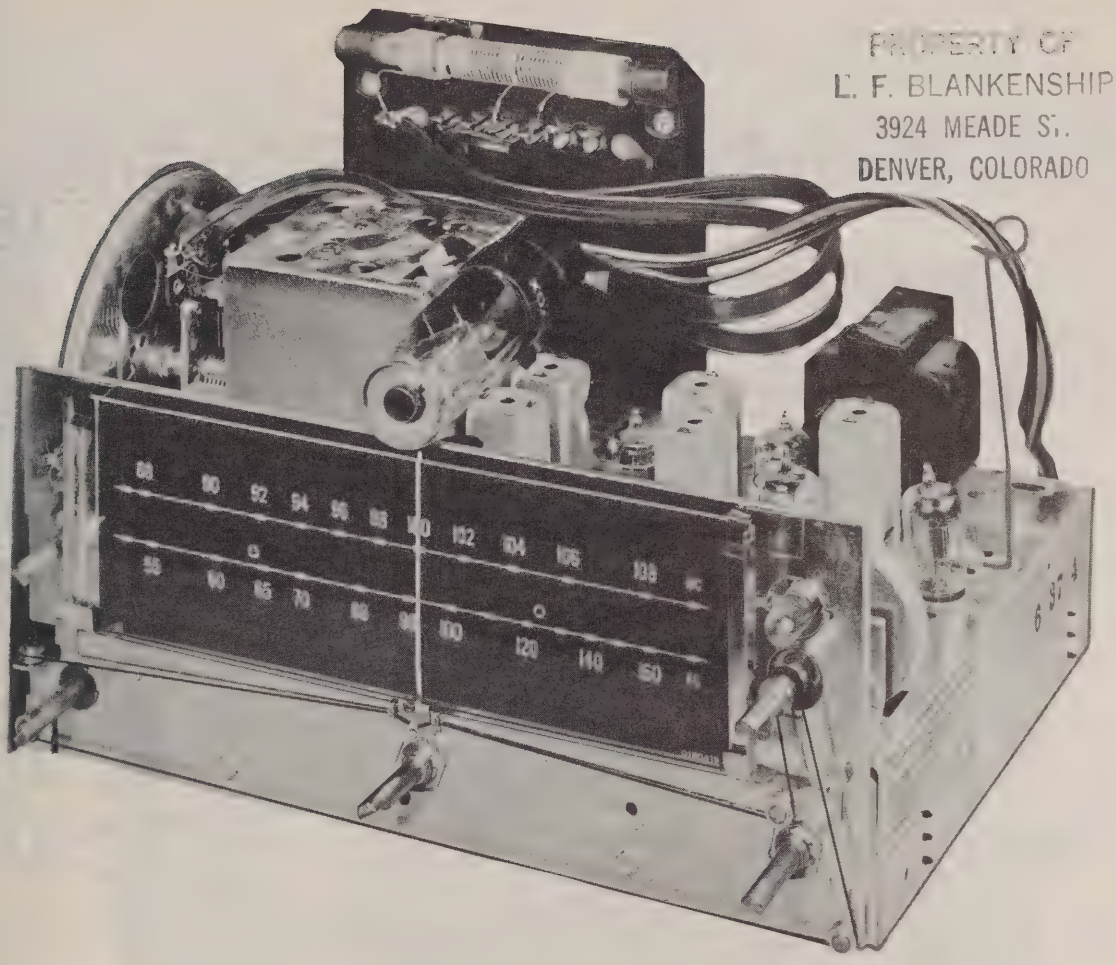
ITEM No.	PART NAME	SILVERTONE PART No.	NOTES
M1	Record Head	Y720094	
M2	Erase Head	720095	
M3	Pilot Light	730016	#47
M4	Switch	013046	Record-Play
M5	Meter	700098	
M6	Motor	011692-2	
	Knob	Y310311	On-Off-Volume, Tone, Motor Switch
	Knob	Y310312	Record-Play, Fast Forward-Rewind
	Knob	220032	Record, Edit
	Cabinet	440378	Includes Lid

CHASSIS—BOTTOM VIEW



Ref. No.	Part No.	Description
		(Include 12)
12	Y460115	Spindle Roll Pin (2)
13	Y580141	Feed and Take-Up Spindle Spacer Washer (1 or 2 Each)
14	Y100924	Foot Switch Lever
15	Y100921	Foot Switch Linkage Wire
16		Base Plate
17	Y011693	Speed Control Knob and Shaft
18	Y580056	Control Knob Washer
19	Y310312	Tape Drive and High Speed Knob (2)
20	Y420177	Brake Plate Spring
21	Y600243	#6-32 x 1/4" Screw, Switch Lever Mounting
22	Y200288	Bracket Spacer and Slide Button, Switch Lever
23	Y600247	#6-32 Set Screw, Cam Retaining
24	Y012345	Tape Drive Control Cam (Include 23)
25	Y460111	Pressure Roller Retainer, Hairpin
26	Y580143	Pressure Roller Washer, Cloth (2)
27	Y011236	Pressure Roller
28	Y600243	"6-32 x 1/4" Screw, Slide Bracket Mounting (3)
29	Y200288	Bracket Spacer and Slide Button (3)
30	Y420174	Capstan Pressure Spring
31	Y012328	Pressure Roller Arm
32	Y012381	Pressure Plate
33	Y100872	Drive and Record Control Link Wire
34	Y460018	Shaft Retainer
35	Y580141	Shaft Special Spacer Washer
36	Y420152	Speed Control Knob Detent Spring
37	Y420151	Speed Control Knob Spring
38	Y220032	Record Lock Knob
39	Y590045	Record Head Hex Nut
40	Y580008	Record Head Washer
41	Y580186	Record Head Spacer Washer
42	Y720094	Recording Head
43	Y590046	Erase Head Hex Nut (2)
44	Y580187	Erase Head Spacer Washer (2)
45		Head Mounting Bracket
46	Y720095	Erase Head (Include 43 & 44)
47	Y420171	Pressure Plate Return Spring
48	Y420104	Pressure Shoe Spring
49	Y011316	Pressure Shoe (Include Felt Pads)
50	Y600247	#6-32 Set Screw, Cam Retaining
51	Y012343	Record Control Shaft Cam and Stud (Include 50)
52		Washer, Felt
53	Y460117	Control Shaft "C" Washer
54	Y600111	Screw, (2) Bracket & Shaft Mounting Assembly
55	Y420181	Foot Switch Lever Return Spring
56	Y580141	Flat Washer
57	Y460110	Take-Up Arm Retainer
58	Y460117	Motion Shaft "C" Washer
59	Y200356	Cam Pin
60	Y580082	Cam Pin "C" Washer
61	Y012377	Take-Up Arm
62	Y580156	Special Washer
63	Y011317	Take-Up and Feed Reel Pulley (2) (Include 64)
64	Y600247	#6-32 x 3/8 Set Screw (2)
65	Y490089	Take-Up and Feed Reel Drive Belt (2)
66	Y200351	Tape Drive Control Shaft
67	Y420176	Take-Up Arm Tension Spring (Long)
68	Y420161	Take-Up Spring
69	Y100809	Take-Up Lever
70	Y420172	Take-Up Lever Brake Spring
71	Y200288	Take-Up Lever Spacer Washer
72	Y600243	Take-Up Lever Retaining Screw
73	Y100760	Speed Control Bracket
74	Y580056	Flat Washer 7/16" O.D.
75	Y011739	Motor Mounting Bracket
76	Y580056	Flat Washer, 7/16" O.D. (4)
77	Y600256	Mounting Bracket Screw (4)
78	Y011692	115V., 60 Cy., Motor
79	Y320059	Rubber Washer
80	Y460125	Record Release Spring Retainer
81	Y420156	Record Release Spring
82	Y420151	Speed Control Compression Spring
83	Y100660	Control Shaft Bracket
84	Y011723	Control Shaft (Include Switch Lever)
85	Y420175	Rewind Arm Tension Spring (Short)
86	Y011694	Flywheel and Shaft Assembly
87	Y490087	Capstan Drive Rubber Belt
88	Y580019	#6 Ext. Lockwasher
89	Y600242	Speed Control Shaft Screw
90	Y600245	#8-32 x 5/8" Screw (3)
91	Y580119	#8 Lockwasher (3)
92	Y580151	Washer (3)
93	Y320053	Motor Mounting Rubber Bushing (3)
94	Y320018	Motor Mounting Spacer (3)
95	Y600153	#8-32 x 3/16" Set Screw
96	Y011321	Motor Fan (Include 95)
97	Y460110	Rewind Cam Retainer
98	Y420173	Rewind Arm Brake Spring
99	Y012378	Rewind Arm
100	Y580156	Special Washer
101	Y012347	Shaft and Cam Assembly, Fast Forward and Rewind
	Y011724	Control Shaft and Bracket Assembly (Include 79, 80, 81, 83 and 84)
	Y012395	Tape Mechanism Back Cover

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO



TRADE NAME	Spartan Chassis CR-712EC, CR-712FC
MANUFACTURER	Spartan Div. 2131 Bueter Road, Fort Wayne 4, Indiana
TYPE SET	Externally Powered FM-AM Tuner
TUBES (Eight)	Types 6BZ6 FM-AM RF Amplifier, 6U8 FM Mixer-Osc., 6BE6 Converter, 6BA6 1st FM-AM IF Amplifier, 6BA6 2nd FM IF Amplifier, 6AL5 Ratio Detector, 12AX7 AF Amp.-Cath. Follower, 6E5 Tuning Indicator
TUNING RANGE—BROADCAST	540KC-1620KC FREQ. MOD. 88MC-108MC

SPARTAN
CHASSIS CR-712

SPARTAN
CHASSIS CR-712

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of H178

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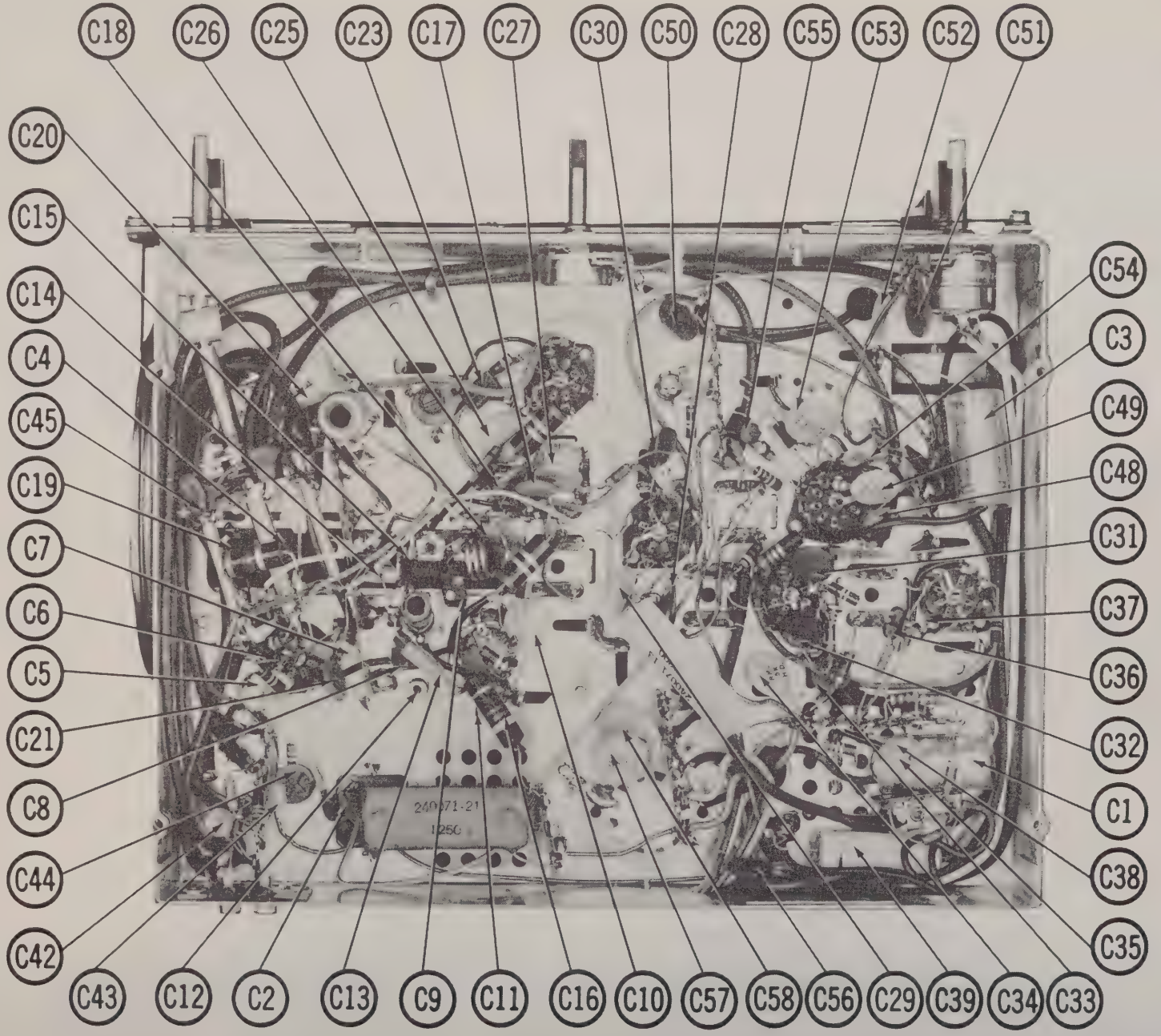
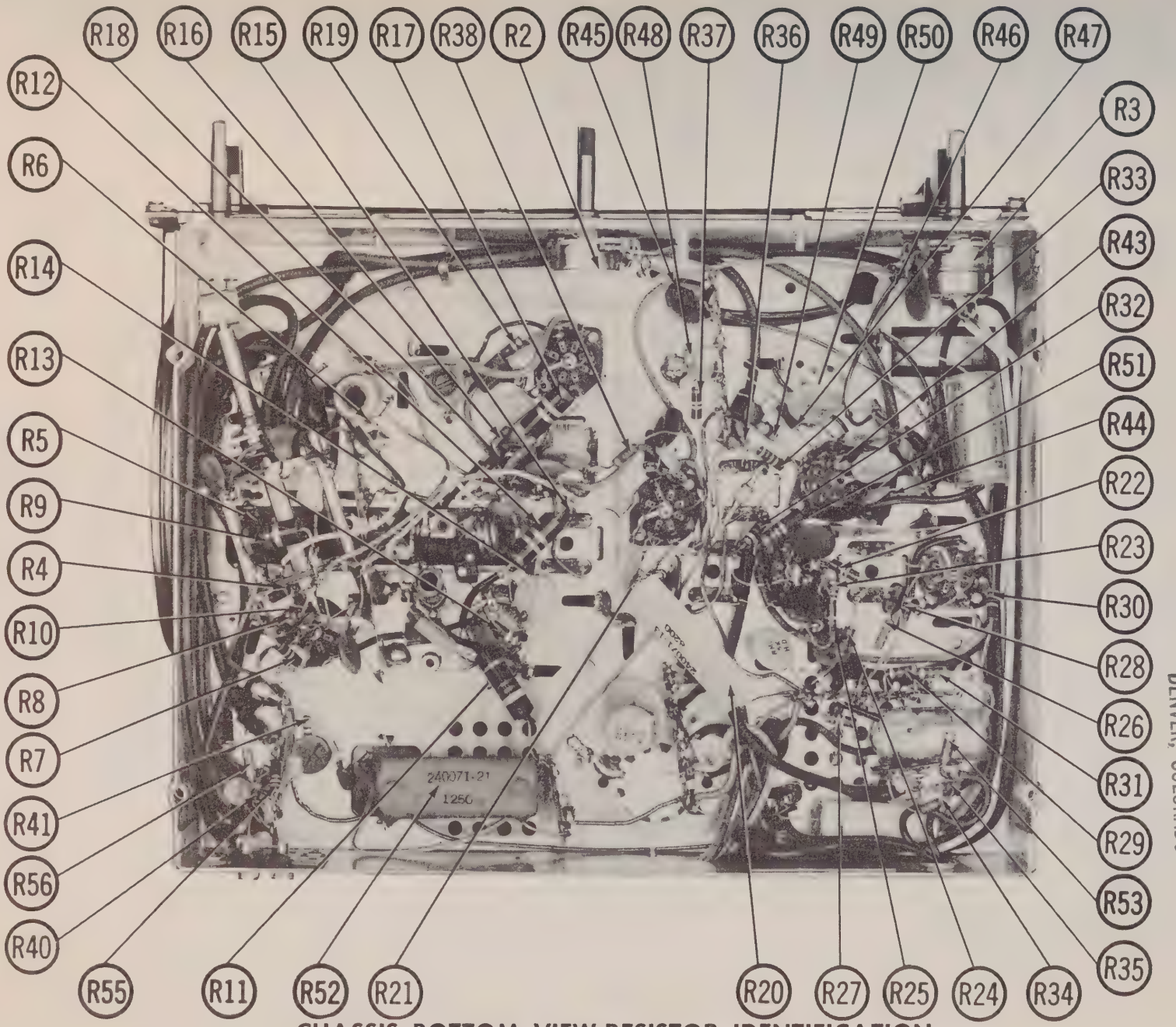


CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

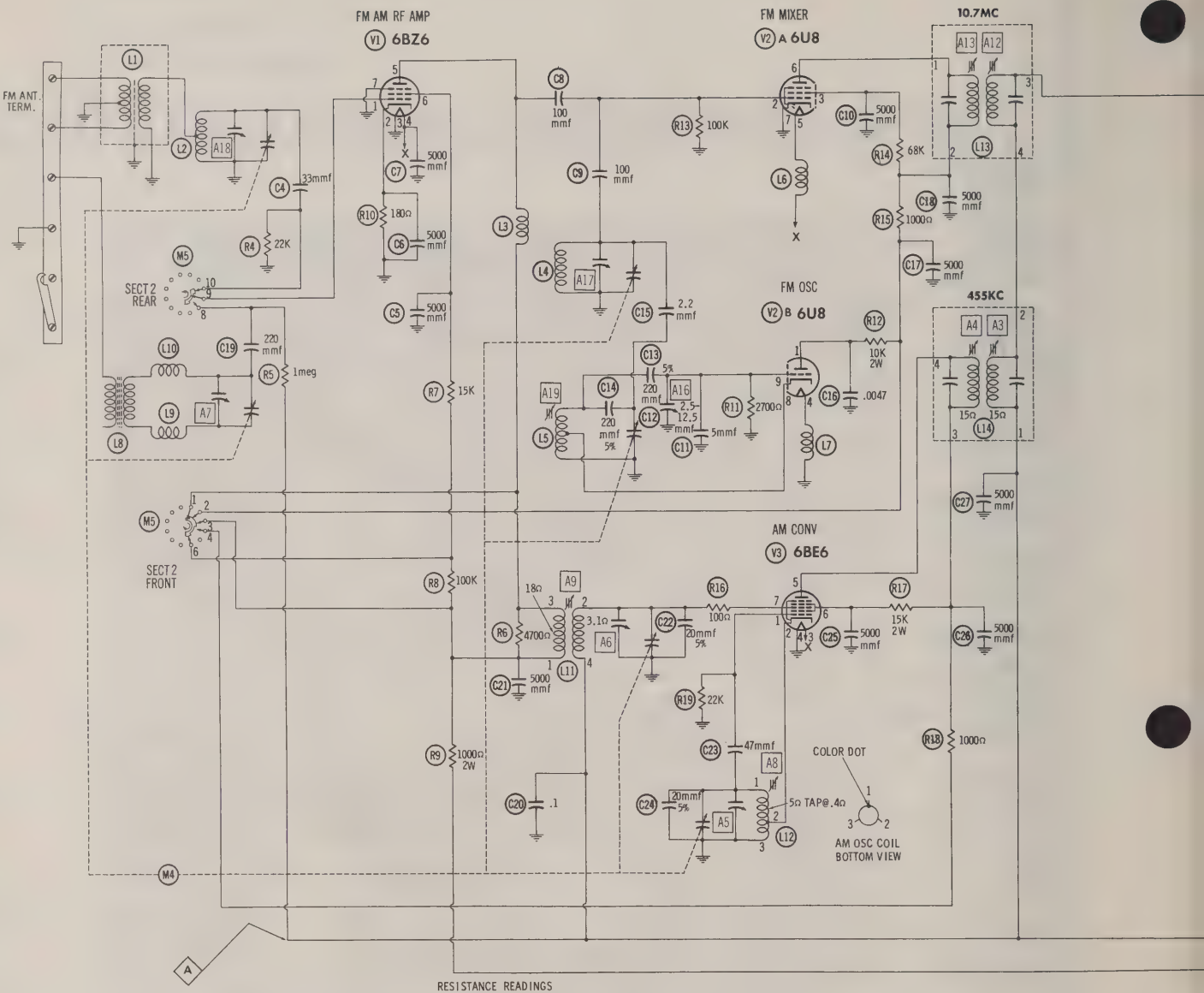


CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE St.
DENVER, COLORADO

FOLDER 13

SPARTAN
CHASSIS CR-712EC



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6BZ6	22K ▪ 3.3Meg	180Ω	0Ω	.1Ω	† 2250Ω	† 17K	0Ω		
V2	6U8	† 12K	100K	† 70K	0Ω	.1Ω	† 3250Ω	0Ω	0Ω	2700Ω
V3	6BE6	22K	.4Ω	.1Ω	0Ω	†▪ 3250Ω	†▪ 18K	2.3Meg		
V4	6BA6	2.3Meg	0Ω	.1Ω	0Ω	† 9000Ω	† 9000Ω	68Ω		
V5	6BA6	.6Ω	0Ω	.1Ω	0Ω	† 2250Ω	† 23K	100Ω		
V6	6AL5	9200Ω	10K	.1Ω	0Ω	INF	0Ω	INF		
V7	12AX7	† 200K	0Ω	3300Ω	1.1Ω	1.1Ω	† 100K	1Meg	5700Ω	0Ω
V8	6E5	0Ω	† 470K	650K	† 1200Ω	0Ω	.1Ω			

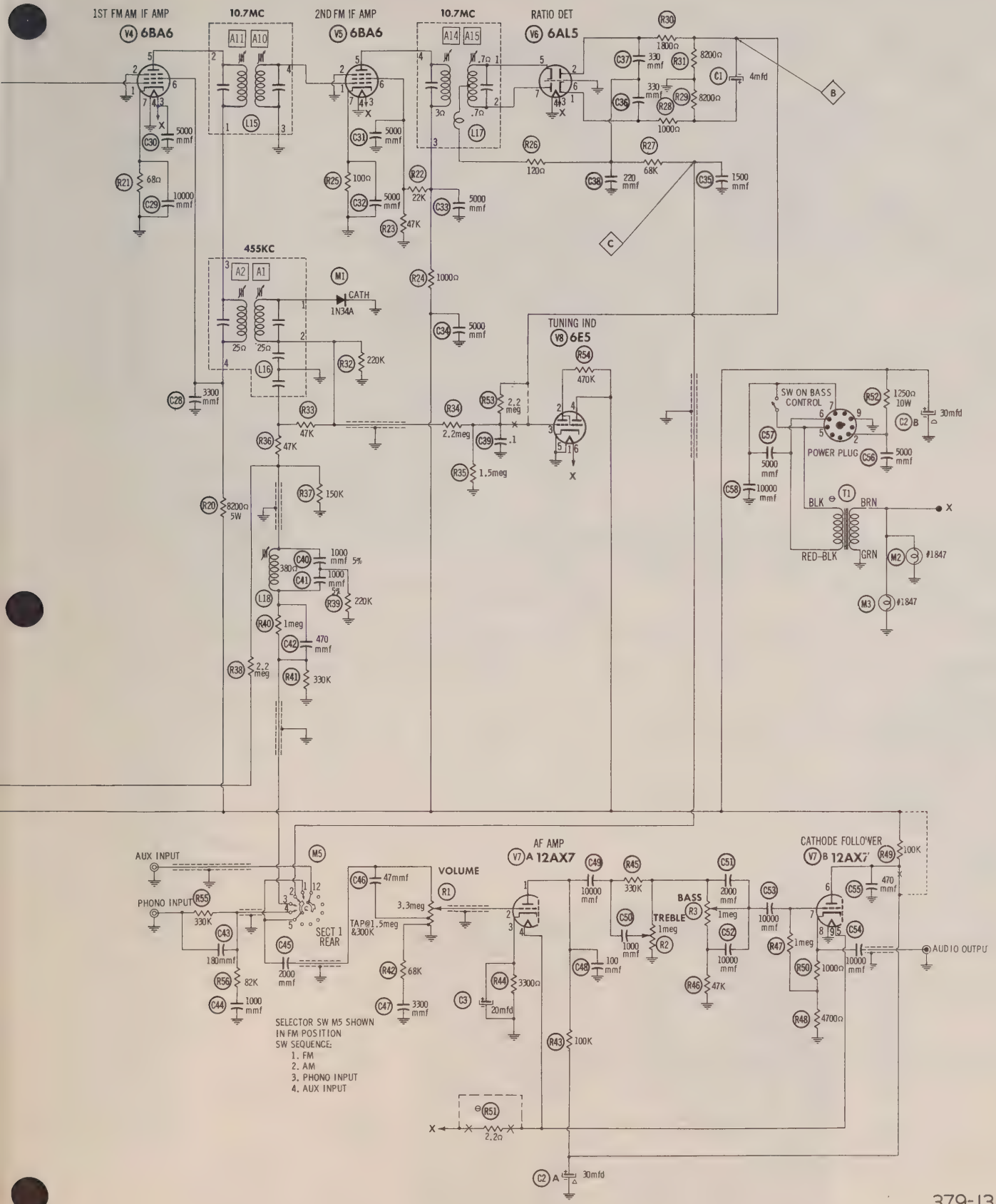
ALL MEASUREMENTS TAKEN IN "FM" POSITION UNLESS OTHERWISE DESIGNATED
† MEASURED FROM PIN 2 OF POWER PLUG
▪ MEASURED IN "AM" POSITION

1. Socket connections are shown as bottom views.
2. Measured values are from socket pin to commom negative.
3. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
Howard W. Sams & Co., Inc. 1957


1ST FM AM IF AMP
V4 6BA6
10.7MC
A11
A10
L15
2ND FM IF AMP
V5 6BA6
10.7MC
A14
A15
L17
RATIO DET
V6 6AL5
R30 1800Ω
C37 330 mmf
R31 8200Ω
C1 4mfd
C36 330 mmf
R29 8200Ω
R28 1000Ω
B
R26 120Ω
R27 68K
C38 220 mmf
C35 1500 mmf
C
C30 5000 mmf
R21 68Ω
C29 10000 mmf
C31 5000 mmf
R25 100Ω
C32 5000 mmf
R22 22K
C33 5000 mmf
R23 47K
455KC
A2
A1
M1
CATH
1N34A
25Ω
25Ω
L16
R24 1000Ω
C34 5000 mmf
TUNING IND
V8 6E5
R54 470K
R32 220K
C28 3300 mmf
R33 47K
R53 2.2 meg
R34 2.2meg
C39 .1
R35 1.5meg
R36 47K
R37 150K
R20 8200Ω 5W
C40 1000 mmf 5%
C41 1000 mmf 5%
R39 220K
L18
R40 1meg
C42 470 mmf
R38 2.2 meg
R41 330K
SW ON BASS CONTROL
R52 1250Ω 10W
C2 B 30mfd
C57 5000 mmf
POWER PLUG
C56 5000 mmf
C58 10000 mmf
T1
BLK
BRN
X
RED-BLK
GRN
M2 #1847
M3 #1847
AUX INPUT
M5
PHONO INPUT
R55 330K
C43 180mmf
R56 82K
C44 1000 mmf
SECT 1 REAR
C45 2000 mmf
C46 47mmf
TAP@1.5meg &300K
3.3meg
VOLUME
R1
R42 68K
C47 3300 mmf
AF AMP
V7A 12AX7
C49 10000 mmf
R45 330K
C50 1000 mmf
TREBLE
1meg
R2
C48 100 mmf
R44 3300Ω
C3 20mfd
R43 100K
BASS
R3 1meg
C51 2000 mmf
C52 10000 mmf
R46 47K
CATHODE FOLLOWER
V7B 12AX7
R49 100K
C53 10000 mmf
C55 470 mmf
C54
R47 1meg
R50 1000Ω
10000 mmf
R48 4700Ω
AUDIO OUTPUT
R51
2.2Ω
C2 A 30mfd
SELECTOR SW M5 SHOWN IN FM POSITION
SW SEQUENCE:
1. FM
2. AM
3. PHONO INPUT
4. AUX INPUT
379-13

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

AM ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
1.	.01MFD	High side to pin 7 (grid) of 6BE6 (V3). Low side to chassis.	455KC (400∿ Mod.)	AM	1000KC	DC probe to point (A). Common to chassis.	A1, A2, A3, A4	Adjust for maximum output.
2.	10MMF	High side to AM antenna terminal. Low side to chassis.	1400KC	"	1400KC	"	A5, A6 A7	"
3.	"	"	600KC	"	600KC	"	A8, A9	" Repeat steps 2 & 3.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
4.	.01MFD	High side to pin 5 (plate) of 6BZ6 (V1). Low side to chassis.	10.7MC (Unmod.)	FM	Low frequency end of dial.	DC probe thru 1Meg to point (B). Common to chassis.	A10, A11, A12, A13, A14	Adjust for maximum deflection.
5.	"	"	"	"	"	DC probe thru 1Meg to point (C). Common to chassis.	A15	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting. Repeat steps 4 & 5.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
4.	.01MFD	High side to pin 5 (plate) of 6BZ6 (V1). Low side to chassis.	10.7MC (300KC Swp)	FM	Low frequency end of dial.	Vert. amplifier thru 1Meg. to point (B). Low side to chassis.	A10, A11, A12, A13, A14	Disconnect stabilizing capacitor C1. Adjust for curve of maximum amplitude and symmetry similar to Fig. 1.
5.	"	"	"	"	"	Vert. amplifier thru 1Meg. to point (C). Low side to chassis.	A15	Reconnect stabilizing capacitor C1. Adjust so that 10.7MC occurs at center of crossover lines similar to Fig. 2. SLIGHTLY retouch A14 for maximum amplitude and straightness of crossover lines. Repeat steps 4 & 5.

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
6.	120Ω & 150Ω carbon resistors.	High side thru 120Ω to FM antenna terminal. Low side thru 150Ω to chassis.	106MC	FM	106MC	DC probe thru 1Meg to point (B). Common to chassis.	A16, A17, A18	Adjust for maximum deflection.
7.	"	"	90MC	"	90MC	"	A19	Adjust for maximum deflection. Repeat steps 6 & 7.

FIG. 1

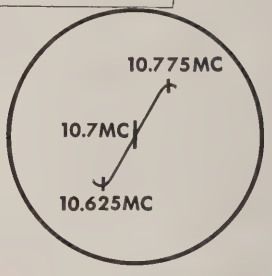
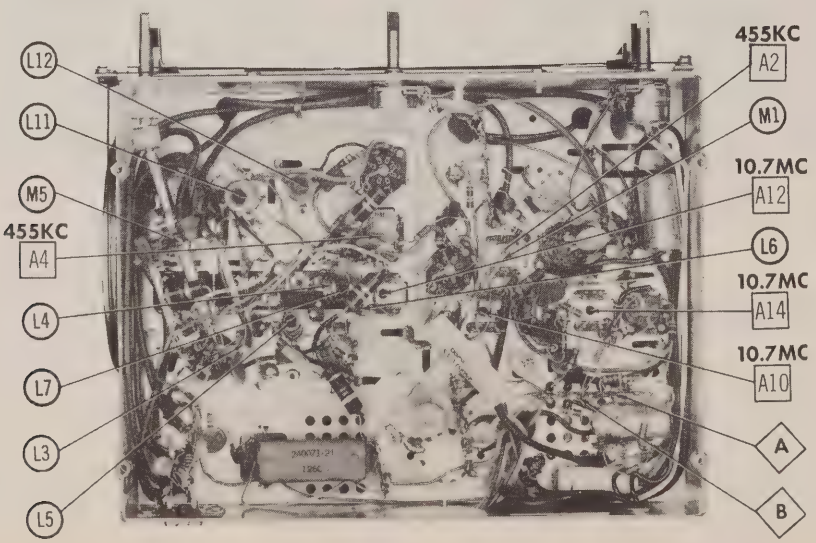


FIG.



CHASSIS BOTTOM VIEW ALIGN. IDENTIFICATION

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	FM-AM RF Amplifier	6BZ6	
V2	FM Osc. - FM Mixer	6U8	
V3	AM Converter	6BE6	
V4	1st FM-AM IF Amp.	6BA6	
V5	2nd FM IF Amplifier	6BA6	
V6	Ratio Detector	6AL5	
V7	AF Amp. - Cath. Follower	12AX7	
V8	Tuning Indicator	6E5	

ELECTROLYTIC CAPACITORS

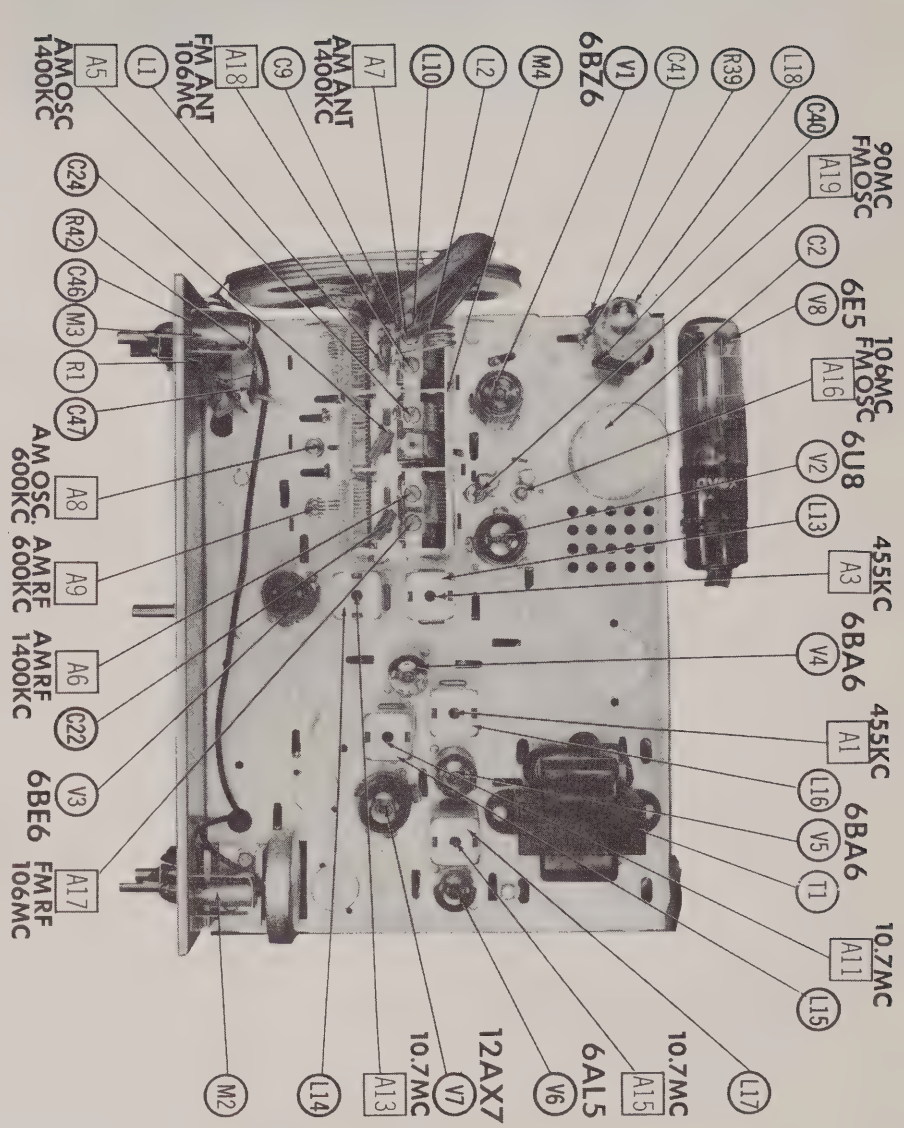
ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA SPARTAN PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1	4	50	270027-27	PRS150V4	BBR4-50	TC30	TD-4-50	MT-0504	TVA-1303
C2A	▲30	450	270021-58	AFH2-54	B0430	FP237	TMD-52	D-225	TVL-2759
B	▲30	450							
C3	20	25	270027-28	PRS50V20	BBR20-25	TC45	TD-20-150	MT-0220	TVA-1205

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA SPARTAN PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C4	33		250187-47	1468-000033	D6-330	5W5Q33	ED-33	UC-5433	1FM-433	
C5	5000		250175-1	BPD-005	DD-502	BYA10D5	ED-005	DC525	5HK-D5	
C6	5000		250175-1	BPD-005	DD-502	BYA10D5	ED-005	DC525	5HK-D5	
C7	5000		250175-1	BPD-005	DD-502	BYA10D5	ED-005	DC525	5HK-D5	
C8	100		250187-53	1468-0001	D6-101	5W5T1	ED-100	MC235	1FM-31	
C9	100		250187-53	1468-0001	D6-101	5W5T1	ED-100	MC235	1FM-31	
C10	5000		250175-1	BPD-005	DD-502	BYA10D5	ED-005	DC525	5HK-D5	
C11	5		250088-138							
C12	2.5-12.5		250188-9							
C13	220		250159-55	1469-00022		22RST22			MS-322	5%
C14	220		250159-55	1469-00022		22RST22			MS-322	5%
C15	2.2		250221-118	NP0-SI 2.2	TCZ-2R2	C10V22C	TCO-2.2		5TCCB-V22	
C16	.0047	400	250211-5	P488N-0047	D6-472	CUB6D47	GP-4700	GEM-6247	6TM-D47	
C17	5000		250175-1	BPD-005	DD-502	BYA10D5	ED-005	DC525	5HK-D5	
C18	5000		250175-1	BPD-005	DD-502	BYA10D5	ED-005	DC525	5HK-D5	
C19	220		250187-57	1468-00022	D6-221	5W5T22	ED-220	UC-5322	1FM-322	
C20	.1	200	250202-13	P288N-1	DF-104	CUB2P1		GEM-201	2TM-P1	
C21	5000		250175-1	BPD-005	DD-502	BYA10D5	ED-005	DC525	5HK-D5	
C22	20		250187-5	1469-00002		22R5Q2			MS-42	5%
C23	47		250187-49	1468-000047	D6-470	5W5Q47	ED-47	UC-5447	1FM-447	
C24	20		250187-5	1469-00002		22R5Q2			MS-42	5%
C25	5000		250175-1	BPD-005	DD-502	BYA10D5	ED-005	DC525	5HK-D5	
C26	5000		250175-1	BPD-005	DD-502	BYA10D5	ED-005	DC525	5HK-D5	
C27	5000		250175-1	BPD-005	DD-502	BYA10D5	ED-005	DC525	5HK-D5	
C28	3300		250175-28	BPD-0033	DD-332	BYA10D33	ED-0033	UC-5233	5GA-D33	
C29	10000		250218-19	BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C30	5000		250175-1	BPD-005	DD-502	BYA10D5	ED-005	DC525	5HK-D5	
C31	5000		250175-1	BPD-005	DD-502	BYA10D5	ED-005	DC525	5HK-D5	
C32	5000		250175-1	BPD-005	DD-502	BYA10D5	ED-005	DC525	5HK-D5	
C33	5000		250175-1	BPD-005	DD-502	BYA10D5	ED-005	DC525	5HK-D5	
C34	5000		250175-1	BPD-005	DD-502	BYA10D5	ED-005	DC525	5HK-D5	
C35	1500		250218-18	BPD-0015	DD-152	BYA10D15	ED-1500	DC5215	5HK-D15	
C36	330		250207-49	SI 330	D6-331	LT6T33	GP-330	UC-5333	5GA-T33	
C37	330		250207-49	SI 330	D6-331	LT6T33	GP-330	UC-5333	5GA-T33	
C38	220		250218-5	BPD-00022	DD-221	L10T22	ED-220	UC-5322	5GA-T22	
C39	.1	200	250202-13	P288N-1	DF-104	CUB2P1		GEM-201	2TM-P1	
C40	1000		250228-354	1467-001		1R5D1		MCE-255	MS-21	5%
C41	1000		250228-354	1467-001		1R5D1		MCE-255	MS-21	5%
C42	470		250218-6	BPD-00047	DD-471	BYA10T47	ED-470	UC-5347	5GA-T47	
C43	180		250175-40		DD-181	L10T18	ED-180		5GA-T18	
C44	1000		250218-8	BPD-001	DD-102	BYA6D1	ED-1000	DC521	5HK-D1	
C45	2000		250218-20	BPD-002	DD-202	BYA10D2	ED-002	DC522	5HK-D2	
C46	47		250218-17	BPD-000047	DD-470	L10Q47	ED-47	UC-5447	5GA-Q47	
C47	3300		250175-28	BPD-0033	DD-332	BYA10D33	ED-0033	UC-5233	5GA-D33	
C48	100		250218-22	BPD-0001	DD-101	L10T1	ED-100	UC-531	5GA-T1	
C49	10000		250218-19	BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C50	1000		250218-8	BPD-001	DD-102	BYA6D2	ED-1000	DC521	5HK-D1	
C51	2000		250218-16	BPD-002	DD-202	BYA10D2	ED-002	DC522	5HK-D2	
C52	10000		250218-19	BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA SPARTAN PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C53	10000		250218-19	BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C54	10000		250218-19	BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C55	470		250175-8	BPD-00047	DD-471	BYA10T47	ED-470	UC-5347	5GA-T47	
C56	5000		250175-1	BPD-005	DD-502	BYA10D5	ED-005	DC525	5HK-D5	
C57	5000		250175-1	BPD-005	DD-502	BYA10D5	ED-005	DC525	5HK-D5	
C58	10000		250219-2	BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA SPARTAN PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	3.3Meg	½	220131-3				UDT-303	Volume, Tap ② 300K & 1.5Meg
B	Shaft						Not Req.	
R2A	1Meg	½	220072-26	AB-68		Q17-137	U52	Treble
B	Shaft			AK-7		Not Req.	Not Req.	
R3A	1Meg	½	220073-20	AB-70	A47-1Meg-Z	Q13-137	U53	Bass
B	Shaft			AK-7	FS-3	Not Req.	Not Req.	
C	Switch			KB-1	SWE-12	76-1	US-26	

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA SPARTAN PART No.	IRC PART No.	NOTES
R4	22K		230104-78	BTS-22K	
R5	1Meg		230104-98	BTS-1Meg	
R6	4700Ω		230104-70	BTS-4700	
R7	15K		230104-76	BTS-15K	
R8	100K		230104-86	BTS-100K	
R9	1000Ω	2	230106-1062	BTB-1000	
R10	180Ω		230104-53	BTS-180	
R11	2700Ω		230104-67	BTS-2700	
R12	10K	2	230106-1074	BTB-10K	
R13	100K		230104-86	BTS-100K	
R14	68K		230104-84	BTS-68K	
R15	1000Ω		230104-62	BTS-1000	
R16	100Ω		230104-50	BTS-100	
R17	15K	2	230106-1076	BTB-15K	
R18	1000Ω		230104-62	BTS-1000	
R19	22K		230104-78	BTS-22K	
R20	8200Ω	5	240071-13		
R21	68Ω		230104-48	BTS-68	
R22	22K		230104-78	BTS-22K	
R23	47K		230104-82	BTS-47K	
R24	1000Ω		230104-62	BTS-1000	
R25	100Ω		230104-50	BTS-100	
R26	120Ω		230104-51	BTS-120	
R27	68K		230104-84	BTS-68K	
R28	1000Ω		230104-62	BTS-1000	
R29	8200Ω		230104-73	BTS-8200	
R30	1800Ω		230104-65	BTS-1800	
R31	8200Ω		230104-73	BTS-8200	
R32	220K		230104-90	BTS-220K	
R33	47K		230104-82	BTS-47K	
R34	2.2Meg		230104-102	BTS-2.2Meg	
R35	1.5Meg		230104-100	BTS-1.5Meg	
R36	47K		230104-82	BTS-47K	
R37	150K		230104-88	BTS-150K	
R38	2.2Meg		230104-102	BTS-2.2Meg	
R39	220K		230104-90	BTS-220K	
R40	1Meg		230104-98	BTS-1Meg	
R41	330K		230104-92	BTS-330K	
R42	68K		230104-84	BTS-68K	
R43	100K		230104-86	BTS-100K	
R44	3300Ω		230104-68	BTS-3300	
R45	330K		230104-92	BTS-330K	
R46	47K		230104-82	BTS-47K	
R47	1Meg		230104-98	BTS-1Meg	
R48	4700Ω		230104-70	BTS-4700	
R49	100K		230104-86	BTS-100K	
R50	1000Ω		230104-62	BTS-1000	
R51	2.2Ω		230109-2	BTS-2.2	Note 1
R52	1250Ω	10	240071-21	PW10-1250	
R53	2.2Meg		230104-102	BTS-2.2Meg	
R54	470K		230104-94	BTS-470K	
R55	330K		230104-92	BTS-330K	
R56	82K		230104-85	BTS-82K	

Note 1. Not used in Chassis when model number suffix includes letter F.

TRANSFORMER (FILAMENT)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	RATING SEC. 3	REPLACEMENT DATA SPARTAN PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC ② .28A	6.3VAC ② 3.2A			320258-2 ③	F5512 ②	P-2947 ①	P-6466 ① ②	21F10 ① ②	F-18X ① ②

① Fabricate mounting. ② Tape center tap on secondary. ③ Part #320277-1 used in Chassis CR-712FD.

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

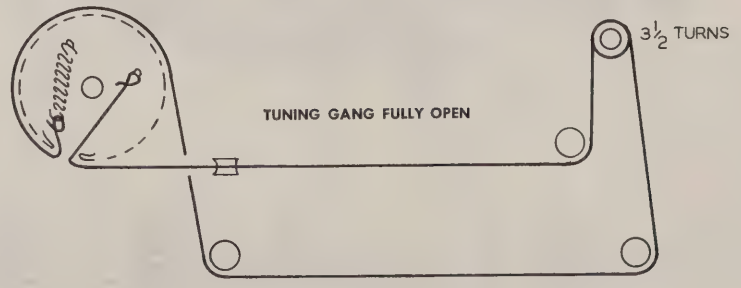
ITEM No.	USE	REPLACEMENT DATA SPARTAN PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	FM Ant. Trans.	360491-3				
L2	FM Ant. Coil	360656-1				
L3	RF Choke	360522-9	19-1002	BC-563	4606	2 Microhenries
L4	FM RF Coil	360629-1				
L5	FM Osc. Coil	360628-1				
L6	Fil. Choke	360522-9	19-1002	BC-563	4606	2 Microhenries
L7	Fil. Choke	360522-9	19-1002	BC-563	4606	2 Microhenries
L8	Loop Stick	360707-2				
L9	RF Choke	360522-9	19-1002	BC-563	4606	2 Microhenries
L10	RF Choke	360522-9	19-1002	BC-563	4606	2 Microhenries
L11	AM RF Trans.	360348-2	14-1076		A-5495-RF	
L12	AM Osc. Coil	360407-2	14-1033	BC-393		
L13	1st FM IF	360626-1	16-3487	FM-254	1463	
L14	1st AM IF	360611-1	16-6758	BC-352	12-C1	
L15	2nd FM IF	360626-1	16-3487	FM-254	1463	
L16	2nd AM IF	360625-1	16-6770	BC-355	12-C6	
L17	Ratio Det.	360627-1	17-3498	FM-255	1465	
L18	10KC Filter	360621-1				500 Millihenries

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA SPARTAN PART No.	CBS PART No.	SYLVANIA PART No.	NOTES
M1	1N34A	530030-2	1N34	1N34A	AM Detector

MISCELLANEOUS

ITEM No.	PART NAME	SPARTAN PART No.	NOTES
M2	Dial Lamp	180161-17	#1847
M3	Dial Lamp	180161-17	#1847
M4	Tuning Cap.	260136-1	6 Gang (AM Sections: Ant. 25-575MMF, RF 25-575MMF, Osc. 25-195MMF)
M5	Switch	160264-1	Bandswitch
	Dial Glass	150419-1	
	Dial Pointer	102448-2	



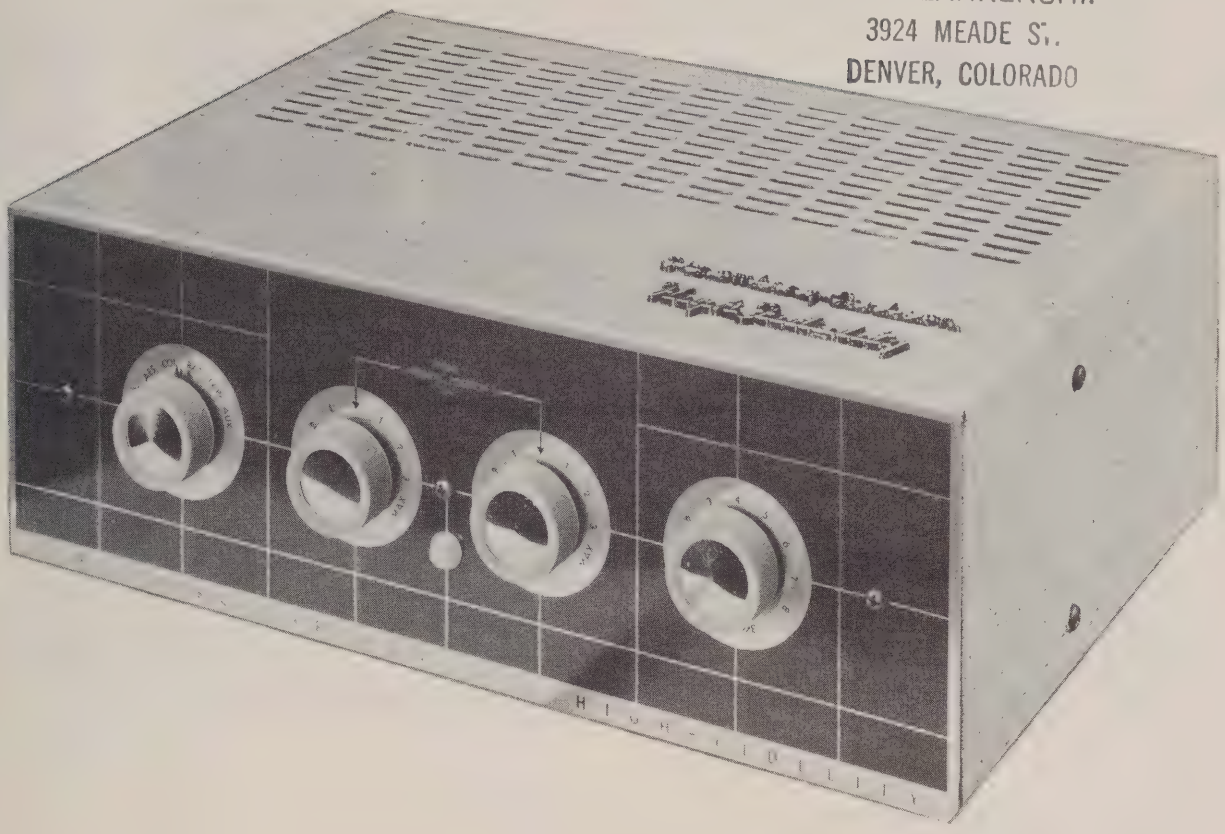
DIAL CORD STRINGING

PHOTOFACT* Folder

STROMBERG-CARLSON MODEL AR-419

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

STROMBERG-CARLSON
MODEL AR-419



STROMBERG-CARLSON
MODEL AR-419

TRADE NAME	Stromberg-Carlson Model AR-419		
MANUFACTURER	Stromberg-Carlson Co., Service Dept., 1700 University Ave., Rochester 10, N. Y.		
TYPE SET	AC Operated Audio Amplifier		
TUBES (Six)	Types 6SJ7 AF Amplifier, 12AT7 AF Amplifier, 12AT7 AF Amp.-Phase Inv., (2) 6L6GB Output, 5U4GB Rectifier		
POWER SUPPLY	110-120 Volts AC-60 Cycles	RATING	1.1 Amp. @ 117 Volts AC (110 Watts)

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed. Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. © 1957 Howard W. Sams & Co., Inc., Indianapolis 5, Indiana. Printed in U.S. of America

PARTS LIST AND DESCRIPTIONS

STROMBERG-CARLSON
MODEL AR-419

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	AF Amplifier	6SJ7	
V2	AF Amplifier	12AT7	
V3	AF Amp. - Phase Inv.	12AT7	

ITEM No.	USE	TYPE	NOTES
V4	Output	6L6GB	
V5	Output	6L6GB	
V6	Rectifier	5U4GB	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	Stromberg-Carlson PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	■30	500	46320-000	AFH2-72	B0530	FP284	TMD-62	D-275	TVL-2937
B	▲30	500							
C2A	▲40	450	35590-000	AFH4-85-25	D0650	FP431.3		Q-310	TVL-4705.8
B	▲15	300							
C	■30	350							
D	50	50							
C3	50	6		XPP6V50	BBR50-6	TT6X50	TD-50-6	MMT-650	TVA-1100

FIXED CAPACITORS

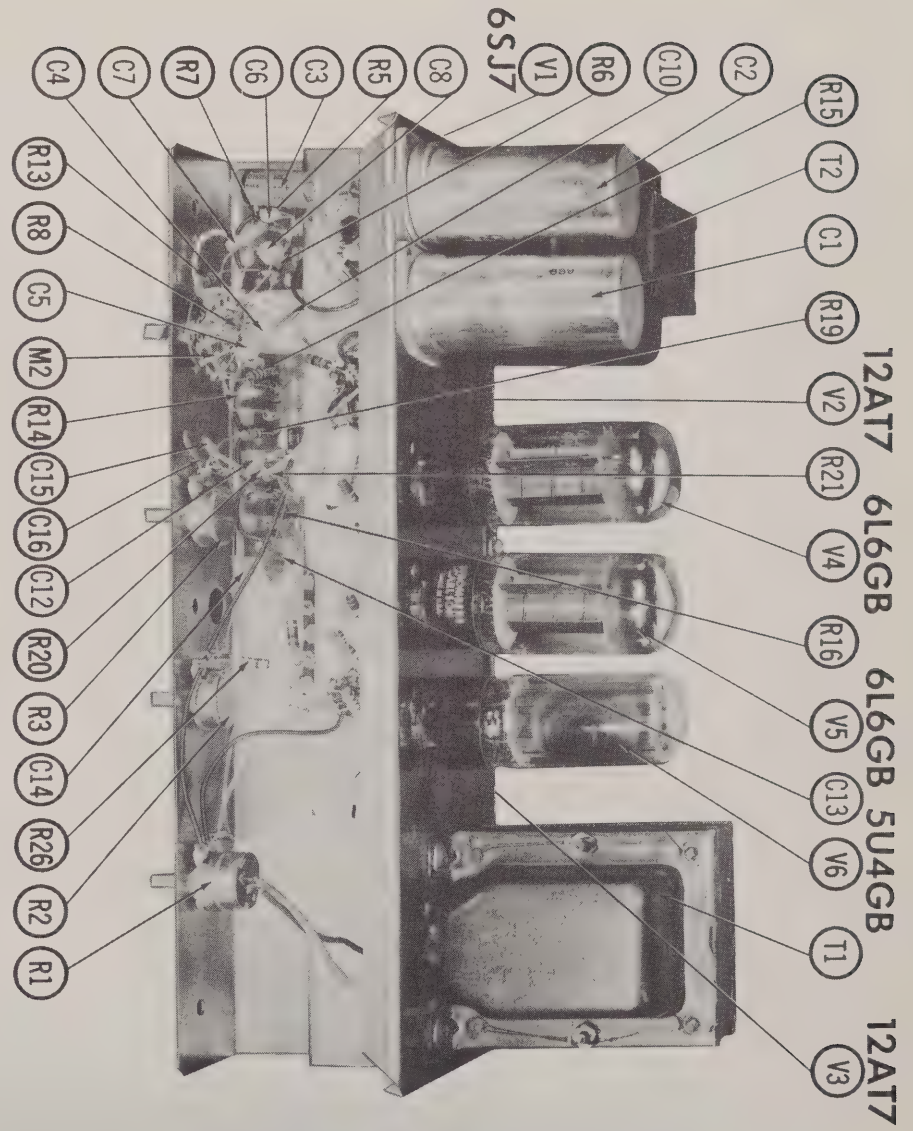
Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	Stromberg-Carlson PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C4	100			BPD-0001	DD-101	L10T1	ED-100	UC-531	5GA-T1	
C5	100			BPD-0001	DD-101	L10T1	ED-100	UC-531	5GA-T1	
C6	100			BPD-0001	DD-101	L10T1	ED-100	UC-531	5GA-T1	
C7	47			SI 47	D6-470	LT6Q47	GP-47	UC-5447	5GA-Q47	
C8	330			BPD-00033	DD-331	L10T33	ED-330	UC-5333	5GA-T33	
C9	.22	400		P488N-22		CUB4P22		GEM-4022	4TM-P22	
C10	4700			BPD-0047	DD-472	BYA10D47	ED-0047	UC-5247	5GA-D47	
C11	.033	400		P488N-033	DF-303	CUB6S33		GEM-4133	6TM-S33	
C12	33			SI 33	D6-330	LT6Q33	GP-33	UC-5433	5GA-Q33	
C13	4700			BPD-0047	DD-472	BYA10D47	ED-0047	UC-5247	5GA-D47	
C14	470			BPD-00047	DD-471	BYA10T47	ED-470	UC-5347	5GA-T47	
C15	470			BPD-00047	DD-471	BYA10T47	ED-470	UC-5347	5GA-T47	
C16	4700			BPD-0047	DD-472	BYA10D47	ED-0047	UC-5247	5GA-D47	
C17	.033	400		P488N-033	DF-303	CUB6S33		GEM-4133	6TM-S33	
C18	470			BPD-00047	DD-471	BYA10T47	ED-470	UC-5347	5GA-T47	
C19	.1	400		P488N-1	DF-104	CUB4P1		GEM-401	4TM-P1	
C20	.1	400		P488N-1	DF-104	CUB4P1		GEM-401	4TM-P1	
C21	.1	400		P488N-1	DF-104	CUB4P1		GEM-401	4TM-P1	

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	Stromberg-Carlson PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	500K	½	145622-000	B-60-S	A47-500K-Z	Q11-133	U48	Volume
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	
C	Switch			Not Req.	SWE-12	76-1	US-26	
R2A	5Meg	½	145661-000	AB-88	A47-5Meg-Z	Q13-141	U65	Treble
B	Shaft			AK-7	FS-3	Not Req.	Not Req.	
R3A	5Meg	½	145661-000	AB-88	A47-5Meg-Z	Q13-141	U65	Bass
B	Shaft			AK-7	FS-3	Not Req.	Not Req.	
R4	100Ω	2	173853-000					Hum Adjust (Wire Wound)

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	Stromberg-Carlson PART No.	IRC PART No.	
R5	100K			BTS-100K	
R6	1Meg			BTS-1Meg	
R7	100K			BTS-100K	
R8	8.2Meg			BTS-8.2Meg	
R9	470K			BTS-470K	
R10	1.8Meg			BTS-1.8Meg	
R11	100K	1		BTA-100K	
R12	3300Ω			BTS-3300	
R13	470K			BTS-470K	
R14	470K			BTS-470K	
R15	33K			BTS-33K	
R16	1.8Meg			BTS-1.8Meg	
R17	33K			BTS-33K	
R18	1000Ω			BTS-1000	
R19	47K			BTS-47K	
R20	470K			BTS-470K	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	Stromberg-Carlson PART No.	IRC PART No.	
R21	470K			BTS-470K	
R22	47K			BTS-47K	
R23	1500Ω			BTS-1500	
R24	4700Ω			BTS-4700	
R25	3300Ω			BTS-3300	
R26	100Ω			BTS-100	
R27	1000Ω			BTS-1000	
R28	470K			BTS-470K	
R29	47K			BTS-47K	
R30	47K			BTS-47K	
R31	220K			BTS-220K	
R32	220K			BTS-220K	
R33	200Ω	5			
R34	15K			BTS-15K	
R35	47K			BTS-47K	
R36	47K			BTS-47K	
R37	5000Ω	7		PW7-5000	

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	Stromberg-Carlson PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC ② 1.1A	720VCT ② .140A	5VAC ② 3A	6.3VAC ② 2.8A	161795-000	P9314 ①	P-3173 ①	PC8410 ①	24R05U ①	R-14A ①

① Drill new mounting holes.

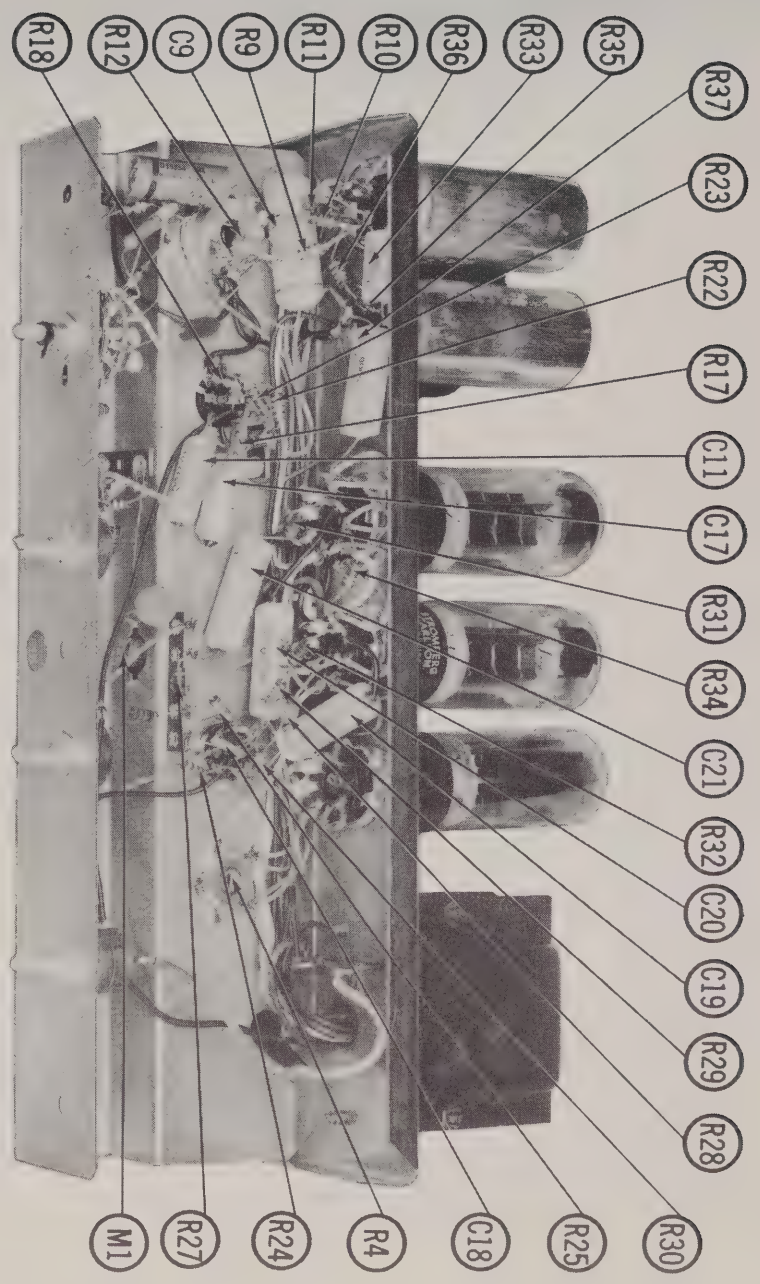
TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	Stromberg-Carlson PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	5700Ω CT	16Ω Tap ② 8Ω, 4Ω	161355-000	Z1401	A-3131	A-3307	22S97 ①	S-60A	① Drill new mounting holes.

MISCELLANEOUS

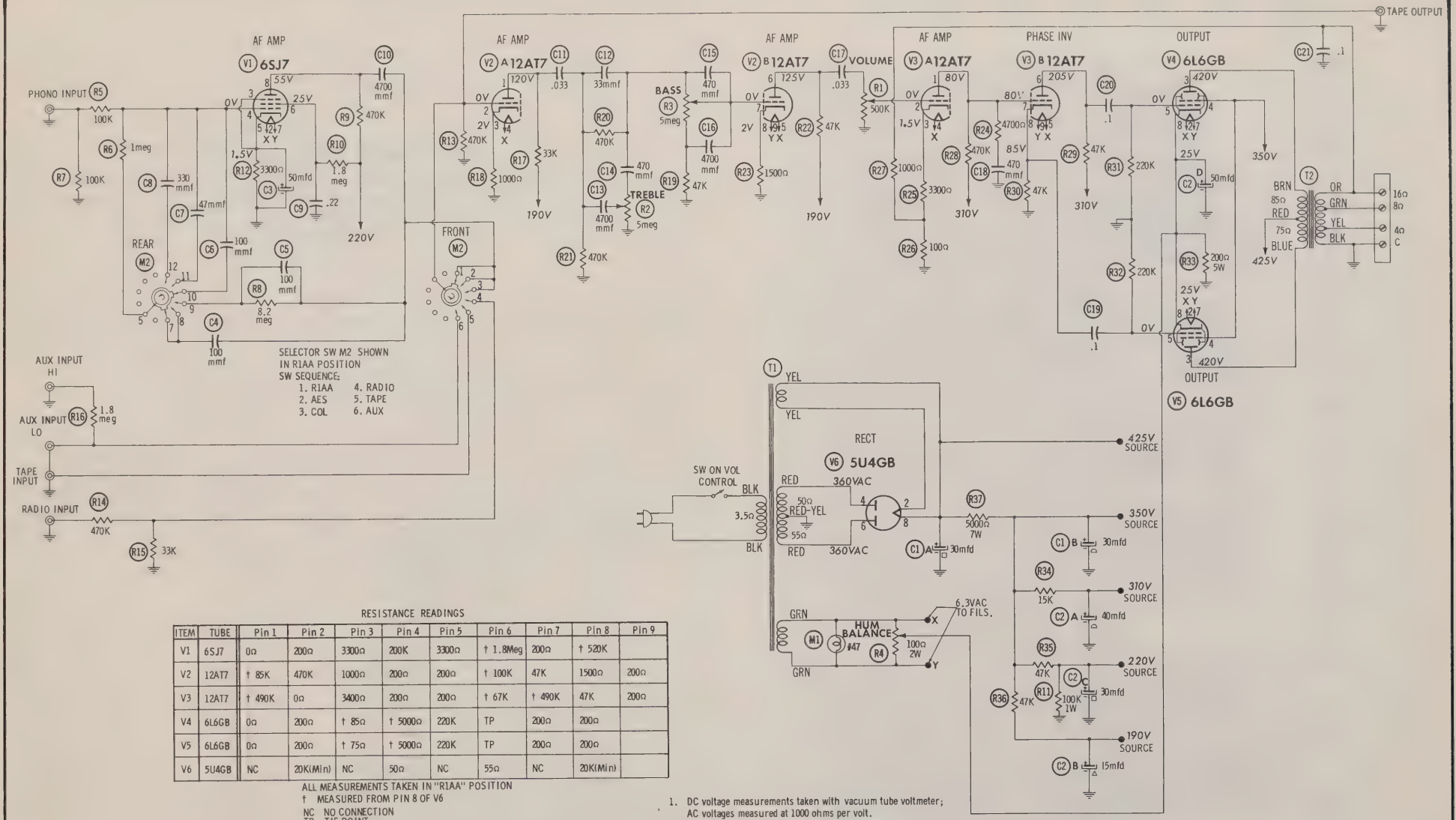
ITEM No.	PART NAME	Stromberg-Carlson PART No.	NOTES
M1	Pilot Lamp		#47
M2	Switch	158692-000	Selector (Rotary Wafer Type)

CHASSIS—BOTTOM VIEW



STROMBERG-CARLSON MODEL AR-419

STROMBERG-CARLSON MODEL AR-419



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6SJ7	0Ω	200Ω	3300Ω	200K	3300Ω	† 1.8Meg	200Ω	† 520K	
V2	12AT7	† 85K	470K	1000Ω	200Ω	200Ω	† 100K	47K	1500Ω	200Ω
V3	12AT7	† 490K	0Ω	3400Ω	200Ω	200Ω	† 67K	† 490K	47K	200Ω
V4	6L6GB	0Ω	200Ω	† 85Ω	† 5000Ω	220K	TP	200Ω	200Ω	
V5	6L6GB	0Ω	200Ω	† 75Ω	† 5000Ω	220K	TP	200Ω	200Ω	
V6	5U4GB	NC	20K(Min)	NC	50Ω	NC	55Ω	NC	20K(Min)	

ALL MEASUREMENTS TAKEN IN "R1AA" POSITION
† MEASURED FROM PIN 8 OF V6
NC NO CONNECTION
TP TIE POINT

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance of component values makes possible a variation of ±15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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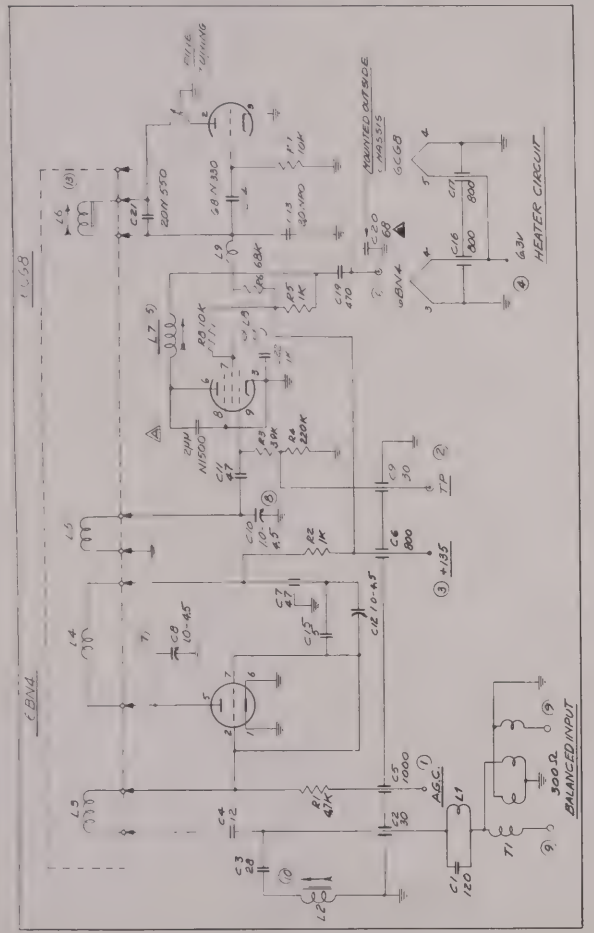
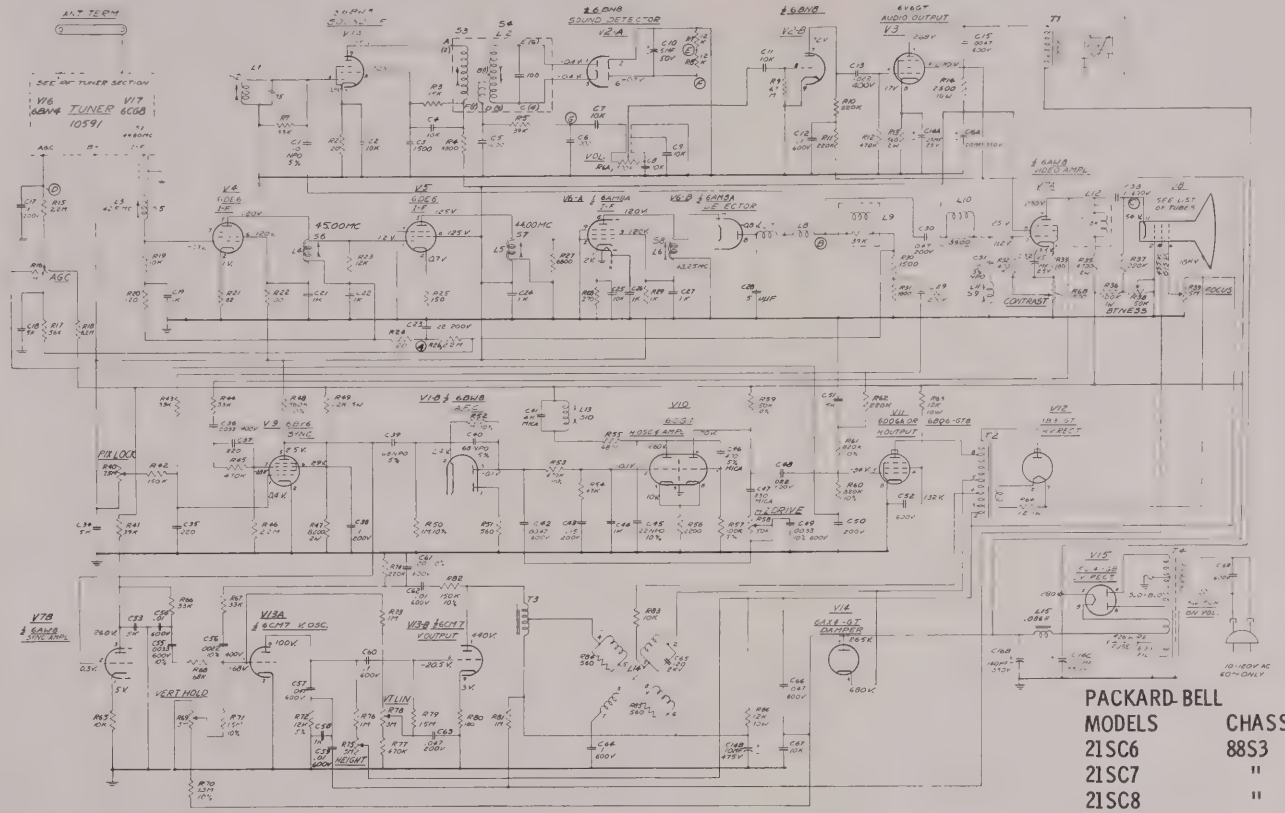
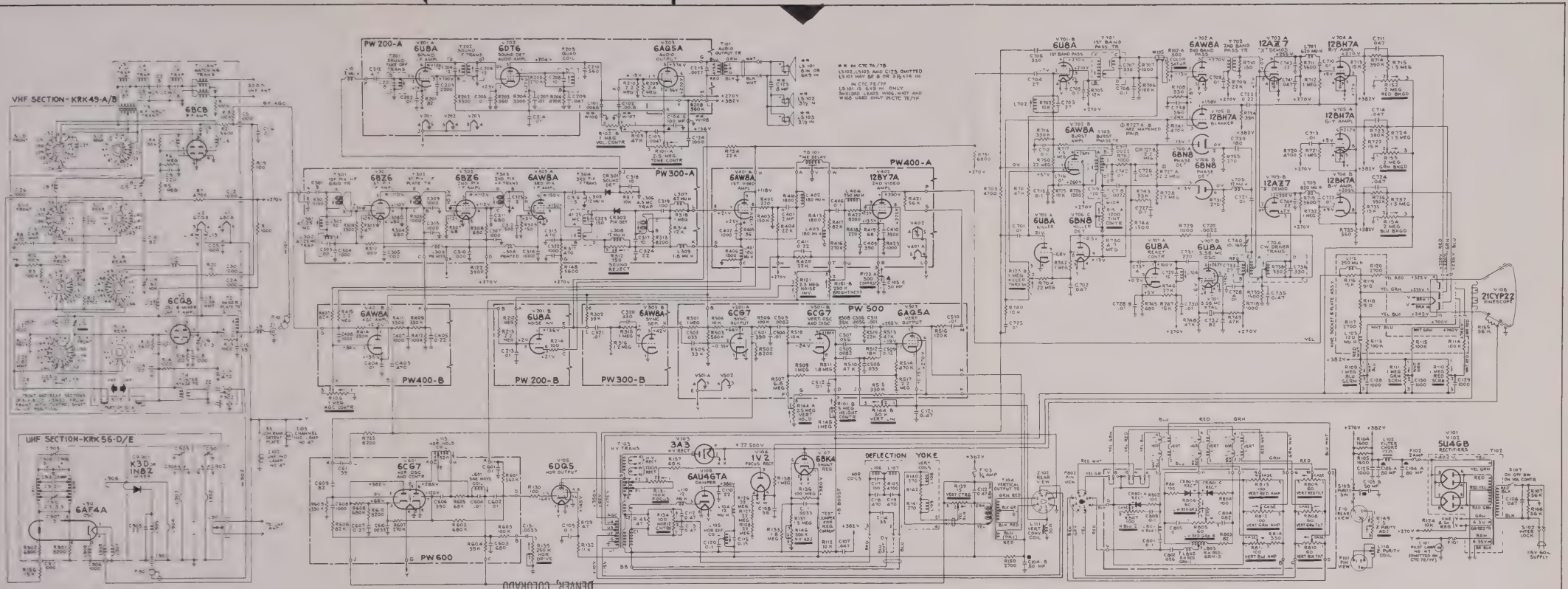




SCHEMATIC COURTESY OF
PACKARD-BELL ELECTRONICS CORP.

PACKARD-BELL MODELS	CHASSIS
21SC6	88S3
21SC7	"
21SC8	"
21SK3	"
21ST3	"
21VT2	"
24SC2	"
24VT1	"



SCHEMATIC COURTESY OF RADIO CORPORATION OF AMERICA

RCA MODELS	CHASSIS				
21CD8725, U	CTC7A, B	21CD8777, U	CTC7A, B	21CD8888, U	CTC7C, D
21CD8727, U	"	21CD8865, U	CTC7C, D	21CD8906, U	"
21CD8775, U	"	21CD8866, U	"	21CD8907, U	"
21CD8776, U	"	21CD8867, U	"	21CD8926, U	CTC7E, F
		21CD8885, U	"	21CD8927, U	"
		21CD8886, U	"	21CD8947, U	"

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The PHOTOFACT Servicer

Vol. 29 Nos. 289 & 290 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ June 15, 1955

The following information on the CDR Rotator Models TR-11 and TR-12 is brought to you through the courtesy of the Radiart Corporation, Cleveland, Ohio.

GENERAL

The Control Box unit was built using a capacitor (110 MFD) to operate with Series 1 and 2 Rotor using the round motor. This control box can be identified by a red mark on the underside of the chassis and if it becomes inoperative it must be returned together with the Rotor to the factory, through the distributor from whom it was purchased.

Series 3 Control Box changed the capacitor which is used on all subsequent series.

Series 4 through 8 incorporated no changes in the control box.

SERVICING OF THE CDR CONTROL BOX

ELECTRICAL SERVICE

IMPORTANT: AC power source must be disconnected.

To service any part of the control unit, first take off rubber bumpers and remove chassis. Check for obvious defects such as loose solder connections, broken switch, burned out transformer, AC 110 Volt power source and also check four wire cable for continuity.

Disconnect cable from control unit and check continuity at terminal strip on the rear of the control box. Any accurate ohmmeter may be used providing the current drawn by the instrument does not exceed 50 milliamperes. Damage to the meter in the control unit may result if a less sensitive ohmmeter is used. Check points, switch positions, and approximate DC resistance values are indicated below.

POINT TO POINT DC RESISTANCE MEASUREMENTS ON CONTROL UNIT

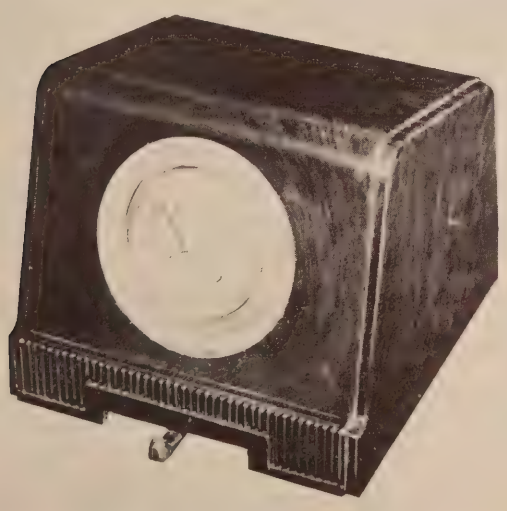
Terminals	Switch	Resistance
1—2 Cap. check (Allow time for cap. to charge)	Center	Avove 100-K ohms
1—4-Transf. Check	Left	3.8 ohms
2—4-Transf. Check	Right	3.8 ohms
3—4-Meter Check	Center	68 to 267 ohms
Line Plug	Left or Right	20-24 ohms
Line Plug to Chassis	Left or Right	Infinite

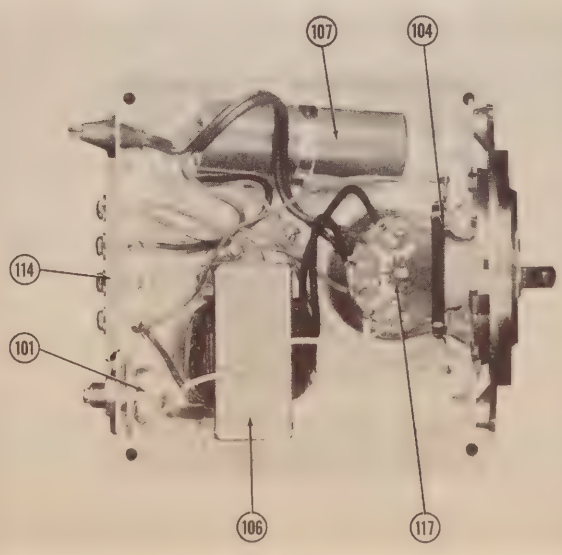
After both units have been re-assembled and Rotor unit mounted on mast, it will be necessary to re-calibrate the indicator as follows:

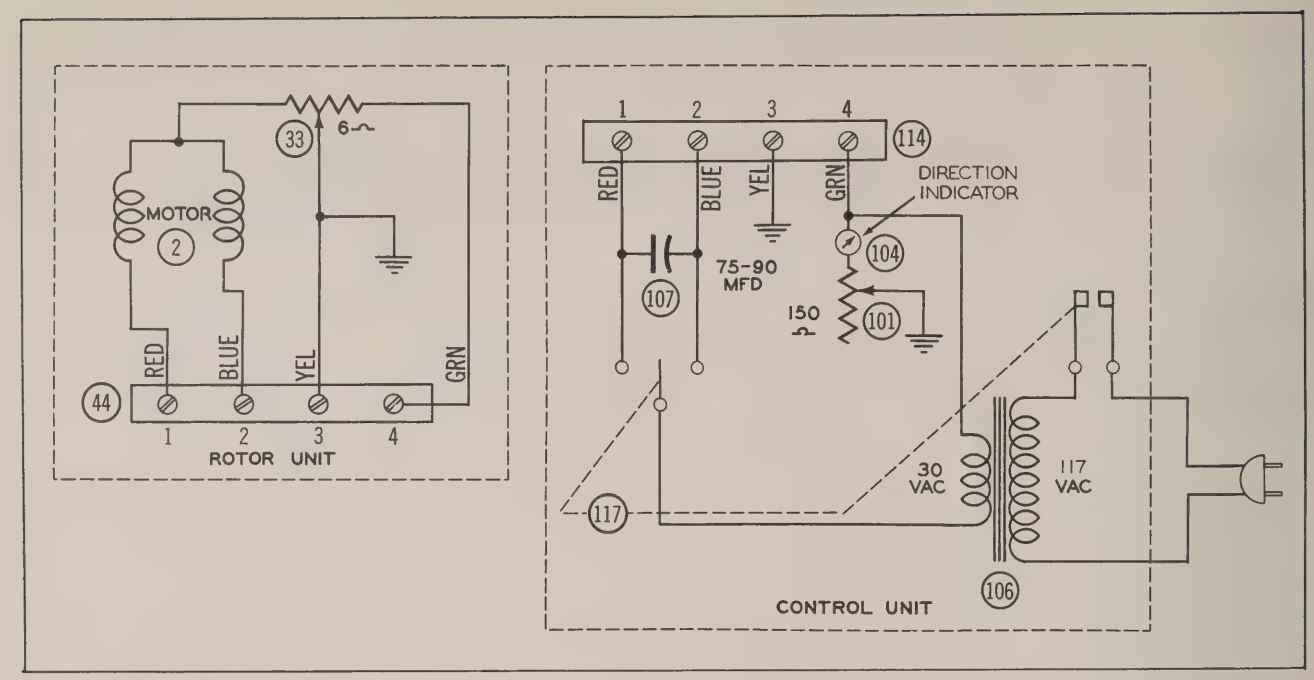
Shift switch to right position to turn the Rotor. When the end of rotation is reached, the needle must be on the right North position. To adjust, rotate the rheostat either in a clockwise or counterclockwise direction until the above condition is obtained.

NOTE: This adjustment is best made as the needle approaches the right North position. Upon the end of rotation, the motor current will increase, which may lead to incorrect calibration at other compass points.

The maximum adjustment is attained when the needle is at a position at the center of the "N" an instant before Rotor reaches the end of revolution.







GENERAL

CDR Rotors TR-11 and TR-12 Series 1 and 2 had a slip clutch and a round motor. This unit is no longer manufactured and repair parts are not available. This series can also be identified by a red mark on the underside of the control box and on the potentiometer assembly in the Rotor. If your Rotor has this round frame motor — both the Rotor and control box must be returned to the factory through the distributor from whom it was purchased.

Series 3, TR-11 and TR-12 incorporated a square motor and changed pinion gears. Identification is made by a blue paint mark on the potentiometer assembly. In the event motor needs replacement order MRU-23 Motor and Mounting Plate Assembly.

Series 4, TR-11 and TR-12 changed the motor mounting plate and gear assembly.

Series 5 incorporated changes in the spur gear assembly and adding of a flat washer with a single spur gear.

Series 6 involves the changing over to a new motor coupling and motor mounting plate assembly.

Series 7 changed from the single spur gear to a double spur gear.

Series 8 changed the contact arm on the potentiometer and added a spring to supply tension.

MECHANICAL SERVICE

To service any part of the Rotor unit first take off the front and rear covers by loosening the screw at the bottom of each cover. Visually inspect unit for obvious signs of trouble such as defective gears, potentiometer out of alignment, broken lead connections, etc.

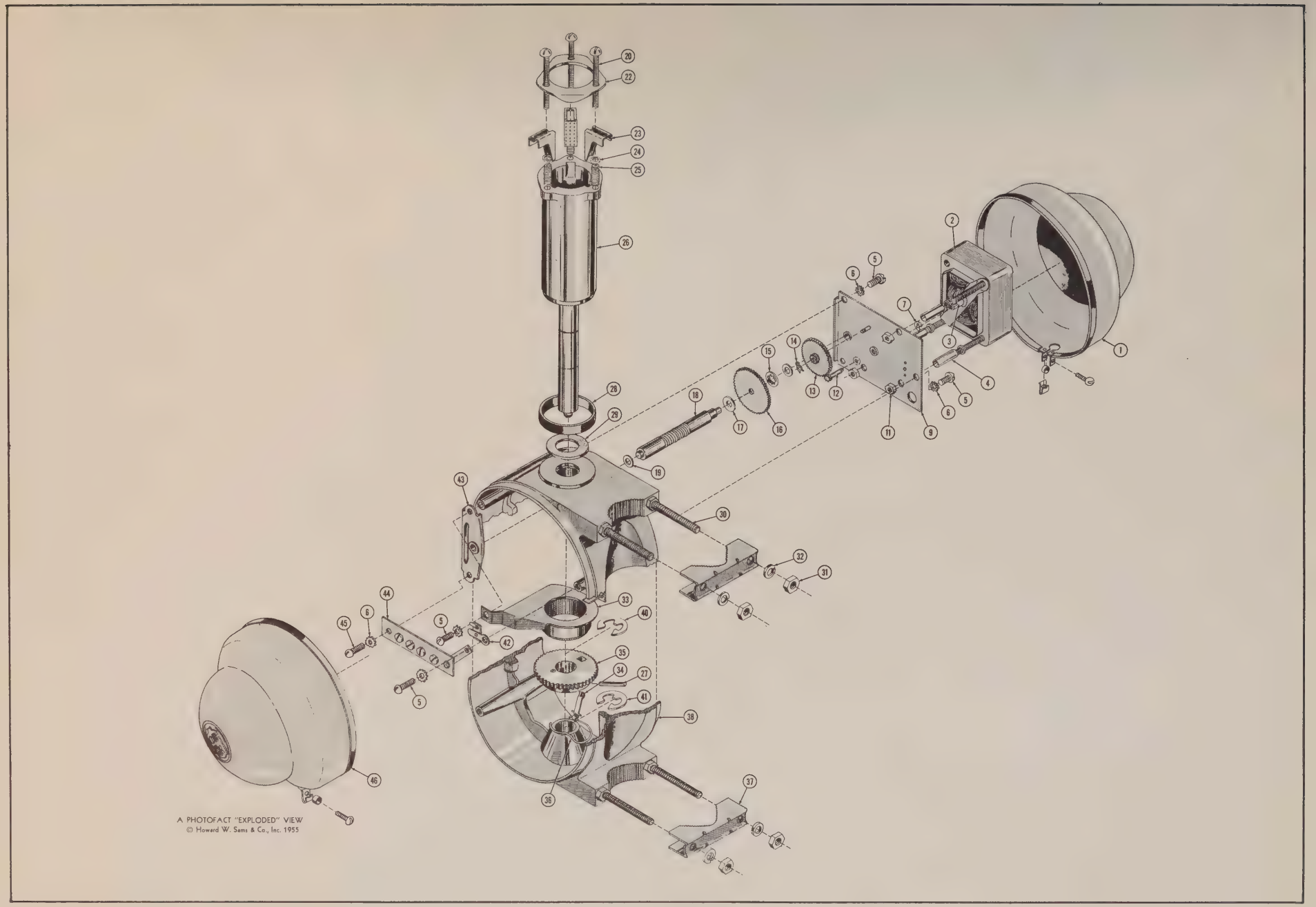
Check the gear assembly for free rotation by placing a finger on the intermediate gear and rotate in either direction. If the gear rotates in one direction only, check unit to make sure it is not at the end of rotation. If the intermediate gear cannot be rotated remove the motor mounting plate and lift assembly of motor and motor mounting plate from housing. Next remove cotter pin from gear shaft and remove intermediate gear. Check motor armature for free rotation by removing motor from motor mounting plate. If the motor is found to have free rotation, check motor pinion gear on motor mounting plate and make sure that gear is not binding in the oilite bearing. If motor pinion is not binding, remove the spur and worm assembly and check worm teeth for cracks and chips. In addition, check spur teeth and note whether spur is securely fastened to worm shaft.

Should it become necessary to remove the large worm gear, first remove potentiometer contact arm from large worm gear. Note: On series 3 thru 7 inclusive — This is done by removing screw from the large worm gear. This will enable the contact arm to fall out. On all subsequent series remove contact arm by dis-assembling spring around large shaft. Contact arm will now disassemble. Remove "C" washer on top of large worm gear (this can be done by using large screw driver). Next slide gear upward along shaft to clear pin in shaft. Remove the pin from shaft. Next remove upper "C" washer on large shaft and slide the shaft up from housing and remove large worm gear.

NOTE: Caution when reassembling. Make sure that potentiometer contact arm is properly assembled within the surface contact of the potentiometer assembly.

After both units have been re-assembled and Rotor unit mounted on mast, it will be necessary to re-calibrate the indicator as follows:

Shift switch lever to right position to turn the Rotor. When the end of rotation is reached, the needle must be on the North position. To adjust, rotate the rheostat either in a clockwise or counter-clockwise direction until the above condition is obtained.


A PHOTOFACT "EXPLODED" VIEW
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PARTS LIST

ITEM NO.	DESCRIPTION (No. in ( ) is Quantity Used)	PART NO.
1	Rear Cover Assembly (1)	RCP-32-2
2A	Motor, Series 6, 7, 8 (1)	RCP-78
B	Motor, Series 4, 5 (1)	RCP-58
C	Motor and Mtg. Plate Series 3 (1)	MRU-23
3A	Coupling, Sleeve, Series 6, 7, 8 (1)	RCP-75
B	Coupling, Sleeve, Series 4, 5 (1)	T-2327
4A	Motor spacer, Series 6, 7, 8 (3)	RCP-73
B	Motor spacer, Series 4, 5 (3)	T-2328
C	Motor spacer, Series 3 (3)	RCP-59-1
5	Screw, #10-24 x 1/2 Type F (5)	SS-473-2
6	Lockwasher, #10 Ext. Tooth (6)	WL-13-2
7	Retaining Ring (1)	RCP29-3
8	Screw, #4-40 x 1/4 Type F (1)	SS-41-2
9A	Mounting Plate Assembly, Series 6, 7, 8 (1)	RCP-1
B	Mounting Plate Assembly, Series 4, 5 (1)	T-2288
C	Mounting Plate Assembly, Series 3 (1)	MRU-5-2
10	Lockwasher, #6 Int. Tooth (3)	WL-4-2
11	Nut, #6-32 Hex (3)	NM-2-2
12A	Pinion Gear, Series 6, 7, 8 (1)	RCP-79
B	Pinion Gear, Series 4, 5 (1)	T-2270
C	Pinion Gear Series 3 (1)	USD-41-2
13	Spur and Pinion Gear Assembly (1)	RCP-68
14	Cotter Pin, (1)	USD-64-3
15	Washer, Spring Grip (1)	WL-43-2
16	Spur Gear (1)	RCP-69
17	Washer, Flat (1)	WP-49-2
18A	Worm (1)	RCP-19-4
B	Worm (1)	RCP-87
19	Washer, Flat (1)	WP-4
20	Screw, Clamping #10-24 (3)	SM-181-2
21	Lockwasher, #10 Int. Tooth (3)	WL-6-2
22	Plate, Clamping (1)	RCP-26
23	Wedges, Clamping (3)	RCP-27
24	Washer, Flat (3)	WP-55-2
25	Spring, coil (3)	RCP-86
26	Socket and Shaft Assembly (1)	RCP-12
27	Pin, Worm Gear (1)	RCP-4
28	Seal, Top (1)	RCP-7
29	Washer, Felt (1)	USD-94
30	Stud, Housing (4)	RCP-62
31	Nut, 1/4-20 Hex (4)	NM-50-2
32	Lockwasher, 1/4 Split (1)	WK-11-2
33	Potentiometer, (1)	MRU-2
34	Contact, Potentiometer (1)	RCP-84
35	Worm Gear Assembly (1)	MRU-22
36	Retaining Spring (1)	RCP-85
37	Clamp, Mast (2)	RCP-28
38	Rotor Housing (1)	RCP-22
39	Disc, Thrust Bearing (1)	USD-60-2
40	Retaining Ring (1)	RCP-29-1
41	Retaining Ring (1)	RCP-8-1
42	Terminal Strip Assembly (1)	MRU-16
43	Mounting Plate Assembly (1)	RCP-1
44	Terminal Strip Assembly (1)	RCP-61
45	Screw, #10-24 x 5/8 Type F (1)	S-474-2
46A	Front Cover Assembly, (1)	RCP-32-1
B	Front Cover Assembly, Flat (1)	RCP-24
47	Rubber Gromet (1)	1G-5
101	Rheostat (1)	MCU-2
102A	Handle, Walnut (1)	MCU-5-1
B	Handle, White (1)	MCU-5-2
103	Bezel (1)	MCU-7
104	Meter (1)	MCU-8-2
105	Spring, Snap (4)	MCU-10
106	Transformer	MCU-13
107	Capacitor (1)	MCU-16
108	Insulator, Switch (1)	MCU-17
109A	Cabinet, Walnut (1)	MX-22-1
B	Cabinet, White (1)	MX-22-2
110	Trademark, Button (1)	MX-31
111	Washer, Ext. Shoulder (1)	MX-38
112	Washer, Flat (1)	MX-39
113	Washer, Plain Fiber (1)	MX-51
114	Strip, Terminal (1)	RCP-5-2
115	Bumper, Recess (4)	RP-36
116	Screw, #6-32 x 1/2 Type F (4)	SS-71-2
117	Switch, Wafer (1)	TRB-5-5
118	Cord and Plug (1)	WM-12-1

The PHOTOFACT Servicer

Vol. 36
Sets 359, 360

★ *Published for all users of Howard W. Sams' Photofact Folders* ★

June 1, 1957

RETMA PRODUCTION SOURCE CODE — 1957

Code symbols assigned to radio-television manufacturers and suppliers, arranged both alphabetically by companies and numerically by code numbers.

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HOWARD W. SAMS & CO., INC.
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ALPHABETICAL LIST

(* Indicates non-members)

Company	Code No.
ACF Electronics, Division of ACF Industries, Inc., Alexandria, Va.	900
*Acme Coil & Transformer Corp., Chicago 14, Ill.	928
*Acme Electric Corporation, Cuba, N. Y.	413
Acro Products Company, Philadelphia 28, Penna.	878
Adler Electronics, Inc., New Rochelle, N. Y.	813
*Admiral Corporation, Chicago 47, Ill.	101
*Aerocoil, Inc., Jersey City, N. J.	908
*Aerolite Electronics Corp., Union City, N. J.	910
Aerovox Corporation, New Bedford, Mass.	102
*Ajax Condenser Co., Inc., Chicago 14, Ill.	705
Aladdin Electronics, a Division of Aladdin Industries, Inc., Nashville 10, Tenn.	689
A.L.A. Industries, Inc., Harrison, N. Y.	1031
Alcon Metal Products, Inc., Chicago 47, Ill.	573
Allen-Bradley Company, Milwaukee 4, Wis.	106
The Alliance Manufacturing Co., Inc., Alliance, Ohio	107
Allied Research & Engineering Div., Allied Record Manufacturing Co., Hollywood 38, Calif.	905
All Star Products, Inc., Defiance, Ohio	110
Alpha Metals, Inc., Jersey City 4, N. J.	733
Altec Lansing Corporation, Beverly Hills, Calif.	391
American Condenser Corporation, Chicago 40, Ill.	109
American Electronics Company, New York 59, N. Y.	978
*American Lava Corporation, Chattanooga 5, Tenn.	681
*American Radio Hardware Co., Inc., Mt. Vernon, N. Y.	502
*American Radionic Co., Inc., Danbury, Conn.	648
American Television & Radio Co., St. Paul 1, Minn.	551
*American Transformer Corp., Chicago 7, Ill.	892
Amperex Electronic Corporation, Hicksville, L. I., N. Y.	111
Amphenol Electronics Corporation, Chicago 50, Ill.	554
*The Amplifone Corporation, Chicago 40, Ill.	1002
*Anaconda Wire & Cable Company, Hastings-On-Hudson 6, N. Y.	547
*Andrea Radio Corporation, Long Island City 1, N. Y.	113
Andrew Corporation, Chicago 19, Ill.	402
Andrews Tower, Inc., Fort Worth 11, Tex.	852
The Antenna Specialists Company, Cleveland 6, Ohio	920
Anton Electronics Laboratories, Inc., Sub. of U. S. Hoffman Machinery Corp., Brooklyn 37, N. Y.	961
*Apex Coil & Transformer Corp., Chicago 8, Ill.	949
A. R. F. Products, Inc., River Forest, Ill.	115
Armel Electronics Inc., Brooklyn 32, N. Y.	893
The Arnold Engineering Company, Sub. of Allegheny Ludlum Steel Corp., Marengo, Ill.	116
Arvin Industries, Inc., Columbus, Ind.	248
Atlantic Wire & Cable Corp., College Point 56, N. Y.	792
*The Astatic Corporation, Conneaut, Ohio	345
*Audio Electric Company, Chicago 26, Ill.	514
Automatic Manufacturing Division, General Instrument Corp., Newark 4, N. J.	119
Automatic Radio Mfg. Co., Inc., Boston 15, Mass.	120
Barker & Williamson, Inc., Upper Darby, Pa.	461
Barnes Metal Products Company, Chicago 23, Ill.	588
*Bartlett Manufacturing Company, Glenview, Ill.	985
Basler Electric Company, Highland, Ill.	695
The Bead Chain Manufacturing Co., Bridgeport 5, Conn.	122
Belden Manufacturing Company, Chicago 44, Ill.	579
Bell Sound Systems, Inc., Columbus 7, Ohio	708
Bendix Radio, Division of Bendix Aviation Corp., Baltimore 4, Md.	125
Benson-Lehner Corporation, Los Angeles 64, Calif.	991
*Best Manufacturing Co., Inc., Irvington 11, N. J.	371
*Better Coil & Transformer Corp., Goodland, Ind.	831
*Blackburn Electronic Corporation, Wyoming, Pa.	912
Bliley Electric Company, Erie, Pa.	128
David Bogen Co., Inc., Sub. Unitronics Corp., Paramus, N. J.	589
Bomac Laboratories Inc., Beverly, Mass.	940
*Bradford Circuits, Evanston, Ill.	1018
*Bradley Laboratories, Inc., New Haven 11, Conn.	812
British Industries Corporation, Port Washington, L. I., N. Y.	409
Brubaker Electronics, Inc., Culver City, Calif.	817
*Burnell & Co., Inc., Yonkers, N. Y.	1014
Caledonia Electronics & Transformer Corp., Caledonia, N. Y.	503
*California Magnetic Control Corp., North Hollywood, Calif.	799
Cal-Tronics Corporation, Los Angeles 45, Calif.	862
Calvideo Tube Corporation, Los Angeles 45, Calif.	886
*Campbell Industries, Inc., Chattanooga 9, Tenn.	1017
C. F. Cannon Co., Springwater, N. Y.	133
Capehart-Farnsworth Company, Fort Wayne 1, Ind.	177
*Carbonneau Industries, Grand Rapids 2, Mich.	719
*Cargo Packers, Inc., Glendale 27, N. Y.	901
*Carol Electronics Corporation, Martinsburg, W. Va.	837
*Carr Fastener Company, Division of United-Carr Fastener Corp., Cambridge 42, Mass.	370
Carter Parts Company, Chicago 10, Ill.	610
C-B-C Electronics Co., Inc., Philadelphia 33, Pa.	867
CBS-Columbia, Division of Columbia Broadcasting System Inc., Long Island City 1, N. Y.	105
CBS-Hytron, Division of Columbia Broadcasting System Inc., Danvers, Mass.	210
Celco (Constantine Engineering Labs. Co.), Mahwah, N. J.	692
Centralab, Div. of Globe-Union Inc., Milwaukee 1, Wis.	134
*Central Coil Company, Indianapolis 22, Ind.	637
Central Electronic Manufacturers, Inc., Denville, N. J.	841
*Chester Cable Corp, Chester, N. Y.	909
Chicago Condenser Corporation, Chicago 47, Ill.	135
*Chicago Electronic Engineering Co., Chicago 47, Ill.	166

Company	Code No.
*Chicago Standard Transformer Division, Essex Wire Corp., Chicago 18, Ill.	138
Chicago Telephone Supply Corp., Elkhart, Ind.	137
Chromatic Television Laboratories, Inc., New York 36, N. Y.	850
Cinch Manufacturing Corporation, Chicago 24, Ill.	139
Clarostat Mfg. Co., Inc., Dover, N. H.	140
*Cleveland Electronics, Inc., Cleveland 3, Ohio	433
Clevite Transistor Products, Division of Clevite Corporation, Waltham 54, Mass.	856
*Clippard Instrument Laboratory, Inc., Cincinnati 31, Ohio	530
*Coilcraft, Incorporated, Cary, Ill.	906
*Coil Engineering & Mfg. Co., Inc., Roanoke, Ind.	141
Collins Radio Company, Cedar Rapids, Ia.	439
*Columbus Process Co., Inc., Columbus, Ind.	450
*Comar Electric Company, Chicago 18, Ill.	1001
*Communication Accessories Company, Hickman Mill, Mo.	1019
Communication Measurements Laboratory, Inc., Plainfield, N. J.	427
Connector Corporation, Chicago 30, Ill.	888
Conrac Incorporated, Glendora, Calif.	680
*Consolidated Radio Products Co., Chicago 10, Ill.	145
Consolidated Wire & Associated Companies, Chicago 16, Ill.	607
Continental Carbon, Div. of Wirt Company, Cleveland 11, Ohio	146
Continental Electric Company, Chicago 2, Ill.	147
Continental Electronics Corp., Philadelphia 31, Penna.	811
*Controls Company of America, Schiller Park, Ill.	711
Convair, Pomona Division, General Dynamics Corp., Pomona, Calif.	898
Corning Glass Works, Corning, N. Y.	148
Cornish Wire Company, Inc., New York 7, N. Y.	149
Cosmic Radio Corporation, New York 59, N. Y.	704
*Crescent Industries, Inc., Chicago 31, Ill.	150
Croname, Incorporated, Chicago 13, Ill.	151
Crosley Radio and Television Division, Avco Manufacturing Corporation, Cincinnati 25, Ohio	152
*C.R.T. Electronics Corp., Mount Vernon, N. Y.	884
Crucible Steel Company of America, New York 17, N. Y.	525
Cubic Corporation, San Diego 11, Calif.	870
Dale Products, Inc., Columbus, Nebr.	816
J. W. Davis & Company, Dallas 9, Texas	563
*Davis Electric Company, Cape Girardeau, Mo.	628
Davis Electronics Co., Burbank, Calif.	865
*Dearborn Glass Company, Bedford Park, Ill.	385
DeJur-Amsco Corporation, Long Island City 1, N. Y.	780
Delco Radio Division, General Motors Corporation, Kokomo, Ind.	466
*Delevan Electronics Corporation, East Aurora, N. Y.	986
*Tobe Deutschmann Corporation, Norwood, Mass.	154
DeWald Radio Mfg. Corp., Long Island City 1, N. Y.	155
*Dinion Coil Co., Inc., Caledonia, N. Y.	895
D & M Products, Detroit 35, Mich.	903
*Dormitzer Electric & Mfg. Co., Inc., Cambridge 40, Mass	493
R. L. Drake Company, Miamisburg, Ohio	851
Drake Manufacturing Company, Chicago 22, Ill.	586
Wilbur B. Driver Company, Newark 4, N. J.	156
DuKane Corporation, St. Charles, Ill.	252
*Dumont-Airplane & Marine Instruments, Inc., New York 5, N. Y.	157
Allen B. DuMont Laboratories, Inc., Clifton, N. J.	158
*DX Radio Products Company, Inc., Chicago 47, Ill.	159
Eberline Instrument Division, Reynolds Electrical and Engineering Co., Santa Fe, New Mexico	994
*Hugh H. Eby Company, Philadelphia 44, Penna.	160
Eckstein Radio & Television Co., Minneapolis 6, Minn.	161
Eitel-McCullough, Inc., San Bruno, Calif.	162
*Elco Corporation, Philadelphia 24, Penna.	599
Eldico Electronics, Sub. Dynamics Corp. of America, Mineola, L. I., N. Y.	783
*Electralab Incorporated, Needham Heights 94, Mass.	1015
*Electrical Utilities Company, La Salle, Ill.	569
*Electrical Windings, Inc., Chicago 39, Ill.	682
The Electro Motive Mfg. Co., Inc., Willimantic, Conn.	164
*Electronic Components Corporation, Chicago 8, Ill.	515
Electronic Devices, Inc., Brooklyn 15, N. Y.	752
Electronic Engineering Company of California, Los Angeles 57, Calif.	941
*Electronic Specialty Co., Los Angeles 39, Calif.	169
Electronic Tube Corporation, Philadelphia 18, Penna.	170
*Electrons, Incorporated, Newark 3, N. J.	935
Electro-Voice, Inc., Buchanan, Mich.	649
*Electro-Winders Co. Inc., Covina, Calif.	984
Elgin Metalformers Corporation, Elgin, Ill.	902
*El-Rad Manufacturing Co., Chicago 18, Ill.	632
Eltran Corporation, St. Anne, Ill.	603
Emerson Radio & Phonograph Corp., Jersey City 2, N. J.	171
*Engineering Services, Inc., Evansville 4, Ind.	601
Ensign Coil Company, Chicago 23, Ill.	172
Erca Tool Die & Stamping Co., Brooklyn 22, N. Y.	762
Erie Resistor Corporation, Erie, Pa.	173
*Esquire Radio Corporation, Brooklyn 19, N. Y.	742
*Essex Electronics, Berkeley Heights, N. J.	425
Farnsworth Electronics Company, Fort Wayne 1, Ind.	938
John E. Fast & Company, Chicago 18, Ill.	178
*Fastex Division, Illinois Tool Works, Des Plaines, Ill.	1
Federal Telephone and Radio Company, Clifton, N. J.	179
Federated Metals Division, American Smelting and Refining Co., New York 5, N. Y.	942
Fidelity Products Co., Inc., So. Orange, N. J.	494
*Filtors, Inc., Port Washington, L. I., N. Y.	977
*Fischer Electric Co., Inc., Chicago 14, Ill.	1006
Five Star Manufacturing Company, Houston 20, Tex.	958
*Florida-Merit Inc., Hollywood, Fla.	987
Forbes & Wagner, Inc., Silver Creek, N. Y.	701
Foto-Video Laboratories, Inc., Little Falls, N. J.	963
*The Forest Electric Company, Forest Park, Ill.	773
*Foster Transformer Company, Cincinnati 23, Ohio	394
Fretco Incorporated, Pittsburgh 13, Penna.	734
*L. H. Frost & Co., Inc., Grand Rapids 8, Mich.	746
*Fugle-Miller Laboratories, Clark, N. J.	1003
*F. & V. Coil Winding Corporation, Newark 5, N. J.	572
*Gabriel Electronics Division, The Gabriel Company, Norwood, Mass.	397
*Gates Radio Company, Quincy, Ill.	187
*Gavitt Wire & Cable Co., Division of American Hard Rubber Co., Brookfield, Mass.	360
*General Cable Corporation, Perth Amboy, N. J.	571
General Cement Mfg. Co., Div. Textron, Inc., Rockford, Ill.	396
*General Communication Company, Boston 15, Mass.	459
General Electric Company, Syracuse 1, N. Y.	188
*General Electronics, Division of Arcturus Electronics Inc., Paterson 3, N. J.	189
The General Industries Company, Elyria, Ohio	190
General Instrument Corporation, Newark 4, N. J.	191
General Magnetic Corporation, Detroit 34, Mich.	193
General Mills, Inc., Mechanical Division, Minneapolis 13, Minn.	927
*General Precision Laboratory Inc., Pleasantville, N. Y.	582
General Products Corporation, Union Springs, N. Y.	913
General Radio Company, Cambridge 39, Mass.	194
General Railway Signal Company, Rochester 2, N. Y.	644
*General Transformer Company, Homewood, Ill.	412
General Transistor Corporation, Richmond Hill 18, N. Y.	990
G. M. Giannini & Co., Inc., Pasadena 1, Calif.	943
Glaser-Steers Corporation, Belleville 9, N. J.	670
*Glass Products Company, Chicago 37, Ill.	475
The Fred Goat Co., Inc., Brooklyn 17, N. Y.	197
Good-All Electric Mfg. Co., Ogalalla, Nebr.	446
Goodline Corporation, Alhambra, Calif.	861
*Gonset Division, L. A. Young Spring & Wire Corp., Burbank, Calif.	983
*Gordos Corporation, Bloomfield, N. J.	806
*Gramer-Halldorson Transformer Corp., Chicago 39, Ill.	596
*Grand Ra-Tronics, Inc., Sub. of Grand Transformers, Inc., Grand Haven, Mich.	996
*Grand Transformers, Inc. Grand Haven, Mich.	757
Grayhill, La Grange, Ill.	992
*Gray & Kuhn Inc., Roslyn Heights, N. Y.	1028
Grigsby-Allison Company, Inc., Arlington Heights, Ill.	467
The Gudeman Company, Chicago 10, Ill.	438
*Guthman Division, Essex Wire Corp., Chicago 7, Ill.	198
The Hallicrafters Co., Chicago 24, Ill.	199
*Hamilton-Hall Mfg. Company, Milwaukee 2, Wis.	936
Hammarlund Mfg. Co., Inc., New York 1, N. Y.	201
Hancock Electronics Corporation, Redwood City, Calif.	1020
Hardwick, Hindle, Inc., Newark 5, N. J.	411
Harman-Kardon, Inc., Westbury, Long Island, N. Y.	794
Hawley Products Company, St. Charles, Ill.	204
Haydu Electronic Products, Inc., Plainfield, N. J.	205
*Henald Manufacturing Co. Inc., Piper City, Ill.	808
*Heppner Manufacturing Company, Round Lake, Ill.	575
The Hickok Electrical Instrument Co., Cleveland 8, O.	508
*Hillburn Electronic Products Co., Brooklyn 22, N. Y.	687
*Hinners-Galanek Radio Corp., Cavalier Radio & Television Div., Long Island City 6, N. Y.	786
Hi-Q Division Aerovox Corporation, Olean, N. Y.	163
Hoffman Electronics Corporation, Los Angeles 7, Calif.	207
*Holyoke Wire and Cable Corporation, Holyoke, Mass.	372
*Hopkins Engineering Company, San Fernando, Calif.	791
Huggins Laboratories, Inc., Menlo Park, Calif.	964
Hughes Aircraft Company, Culver City, Calif.	744
*Hupp Electronics Co., Forest Park, Ill.	501

Company	Code No.
Hycon Electronics, Inc., Pasadena, Calif.	1007
Hy-Gain Antenna Products Company, Lincoln 4, Nebr.	894
*Illinois Condenser Company, Chicago 22, Ill.	616
The Indiana Steel Products Company, Valparaiso, Ind.	211
Inductor Engineering, Inc., Lewes, Del.	915
Industrial Development Engineering Associates, Inc., Indianapolis 26, Ind.	638
*Industrial Hardware Manufacturing Co., Inc., New York 12, N. Y.	866
*Industrial Tubes, Inc., Geneva, Ill.	972
International Electronic Industries, Inc., Nashville 1, Tenn.	911
*International Electronics Corp., New York 12, N. Y.	1022
International Electronics Research Corp., Burbank, Calif.	1023
International Instruments, Inc., New Haven 15, Conn.	855
International Rectifier Corporation, El Segundo, Calif.	845
International Resistance Company, Philadelphia 8. Pa.	214
International Telemeter Corp., Los Angeles 25, Calif.	887
*Ion Capacitor Corp., Columbia City, Ind.	1013
Jackson Electrical Instrument Co., Dayton 2, Ohio	216
*James Vibrapowr Company, Chicago 18, Ill.	863
J-B-T Instruments, Inc., New Haven 8, Conn.	442
Jeffers Electronics Division, Speer Carbon Company, Dubois, Penna.	724
*Jefferson Electric Company, Bellwood, Ill.	218
Jefferson-Travis Incorporated, Sub. Emerson Radio & Phonograph Corp., Brooklyn, N. Y.	219
Jensen Manufacturing Company, Div. of The Muter Company, Chicago 38, Ill.	220
Jerrold Electronics Corporation, Philadelphia 3, Pa.	923
Jersey Specialty Co., Inc., Mountainview, N. J.	730
*J. E. T. Electronics Company, Glendale 4, Calif.	1004
JFD Manufacturing Co., Inc., Brooklyn 4, N. Y.	221
*J & G Machine Company, Worcester 8, Mass.	945
E. F. Johnson Company, Waseca, Minn.	222
Johnson Electronics Inc., Orlando, Fla.	784
Johnson & Hoffman Mfg. Corp., Sub. Superior Tube Company, Mineola, N. Y.	639
Kay Electric Company, Pine Brook, N. J.	620
Kay Lab, San Diego 11, Calif.	925
*Keiser's Industries, Inc., Mt. Holly Springs, Penna.	1029
*Kemtron Electron Products, Inc., Newburyport, Mass.	1016
Kerrigan Lewis Manufacturing Co., Chicago 51, Ill.	223
Kester Solder Company, Chicago 39, Ill.	224
Keystone Electronics Company, Newark 4, N. J.	699
Kimble Glass Company, Sub. of Owens-Illinois Glass Co., Toledo 1, Ohio	647
King Laboratories, Inc., Syracuse 3, N. Y.	225
Kip Electronics Corporation, Stamford, Conn.	593
*Kline Iron and Steel Company, Columbia, S. C.	869
*The James Knights Company, Sandwich, Ill.	504
*Kobzy Tool Company, Chicago 22, Ill.	594
Kost Products Company, Inc., Chicago 39, Ill.	951
Leach Corporation, Los Angeles 3, Calif.	1024
*Lear, Incorporated, Los Angeles 64, Calif.	227
*Lectrohm, Inc., Chicago 30, Ill.	974
Lenz Electric Manufacturing Co., Chicago 47, Ill.	228
*Leonard Electric Products Co., Inc., Brooklyn 32, N. Y.	570
*Lewis and Kaufman, Ltd., Los Gatos, Calif.	738
Littelfuse, Incorporated, Des Plaines, Ill.	230
Litton Industries, Inc., Beverly Hills, Calif.	879
Lowell Manufacturing Company, St. Louis 17, Mo.	657
*Lytle Engineering & Mfg. Co., Chicago 3, Ill.	671
Machlett Laboratories, Incorporated, Springdale, Conn.	231
The Magnavox Company, Fort Wayne 4, Ind.	232
*Magnetic Coil Manufacturing Company, Chicago 22, Ill.	933
*Magnetic Windings Division (Essex Wire Corporation), Easton, Pa.	352
P. R. Mallory & Co., Inc., Indianapolis 6, Ind.	238
H. S. Martin & Company, Evanston, Ill.	686
*Marvel Electric Corporation, Chicago 22, Ill.	583
McCoy Electronics Co., Mt. Holly Springs, Penna.	832
McGregor Electronic Industries, Inc., McGregor, Ia.	789
McIntosh Laboratory, Inc., Binghamton, N. Y.	793
Measurements Corporation, Boonton, N. J.	236
Mechanical Steel Tubing Corporation, Bronx 59, N. Y.	946
*Mel-Rain Corporation, Indianapolis 3, Ind.	834
*Merit Coil & Transformer Corp., Chicago 40, Ill.	239
Methode Manufacturing Corp., Chicago 47, Ill.	720
Micamold Electronics Manufacturing Corp., Sub. General Instrument Corp., Brooklyn 37, N. Y.	240
*Micropulse Engineering, Burbank, Calif.	1021
Microtran Company, Inc., Valley Stream, L. I., N. Y.	768
Microwave Associates, Inc., Burlington, Mass.	803
Midland Manufacturing Co., Inc., Kansas City 15, Kan.	828
*Mid-West Coil & Transformer Co., Chicago 14, Ill.	549
Midwest Speaker Company, McGregor, Iowa	993
James Millen Manufacturing Co., Inc., Malden 48, Mass.	242
Milwaukee Resistor Company, Milwaukee 4, Wis.	722
Miniature Electronics Components, Nashville 4, Tenn.	885
*Model Engineering & Manufacturing, Inc., Chicago 18, Ill.	976
Moloney Electric Company, St. Louis 20, Mo.	965
Mosley Electronics, Incorporated, St. Louis 14, Mo.	750
Motorola Inc., Chicago 51, Ill.	185
Mullenbach Division of Electric Machinery Mfg. Co., Los Angeles 58, Calif.	966
Multi-Tron Laboratory, Inc., Chicago 44, Ill.	693
*Muntz TV, Inc., Chicago 13, Ill.	772
The Muter Company, Chicago 5, Ill.	244
Mycalex Corporation of America, Clifton, N. J.	642
National Aeronautical Corporation, Ambler, Pa.	643
*National Company, Inc., Malden 48, Mass.	245
*National Electronics, Inc., Geneva, Ill.	749
National Fabricated Products, Div. of Hoffman Electronics Corp., Chicago 47, Ill.	246
National Moldite Company, Hillside 5, N. J.	367
*National Tel-Tronics Corp., Yonkers, N. Y.	999
*National Video Corporation, Chicago 32, Ill.	836
*Newcomb Electronics Corporation, Hollywood 38, Calif.	437
New York Transformer Co., Inc., Alpha, N. J.	366
North American Aviation, Inc., Downey, Calif.	967
North American Philips Company, Inc., New York 17, N. Y.	423
Northwest Plastics, Inc., St. Paul 1, Minn.	723
*NYT Electronics, Inc., Burbank, Calif.	1030
Oak Electronics Company, Buffalo 3, N. Y.	739
Oak Mfg. Co., Chicago 10, Ill.	249
*Oaktron Electric Company, Tinley Park, Ill.	934
*Oaktron Industries Inc., Monroe, Wis.	918
*Ogden Coil & Transformer Co., Chicago 12, Ill.	776
The Ohio Carbon Company, Cleveland 11, Ohio	250
Ohmite Manufacturing Company, Skokie, Ill.	251
Olympic Products Co., Inc., Alpha 1, N. J.	740
Olympic Radio & Television, Div. Unitronics Corp., Long Island City 1, N. Y.	200
Onondaga Pottery Company, Electronics Division, Syracuse 1, N. Y.	848
*Ontario Industries, Inc., Hornell, N. Y.	960
Orradio Industries, Inc., Opelika, Ala.	840
Otis Radio & Electric Corp., Hawarden, Iowa	552
Oxford Electric Corporation, Chicago 15, Ill.	465
Pacific Semiconductors, Inc., Culver City, Calif.	947
Packard-Bell Electronics Corp., Los Angeles 64, Calif.	254
Pan-Electronics Corporation, Griffin, Ga.	904
Parisian Novelty Company, Chicago 9, Ill.	257
Parker Metal Goods Company, Worcester 8, Mass.	929
*Park Products Company, Cleveland 3, Ohio	1011
*Paul & Beekman, Inc., Philadelphia 40, Pa.	736
*PCA Electronics Inc., Sepulveda, Calif.	973
Penn Television Products Company, Philadelphia 34, Pa.	726
Penn Tran Corporation, Bellefonte, Pa.	665
Penta Laboratories, Inc., Santa Barbara, Calif.	771
*Perfection Electric Company, Chicago 16, Ill.	592
Permo, Incorporated, Chicago 26, Ill.	259
*Phalo Plastics Corporation, Worcester 8, Mass.	697
Philco Corporation, Philadelphia 34, Pa.	260
*Philmore Manufacturing Co., Inc., New York 3, N. Y.	262
*Pickering and Company, Inc., Oceanside, N. Y.	631
Pilot Radio Corporation, Long Island City 1, N. Y.	264
Pioneer Electronics Corporation, Los Angeles 64, Calif.	706
Plamondon Magnetics Company, Chicago 22, Ill.	882
*Planet Manufacturing Corporation, Bloomfield, N. J.	761
*Plastoid Corporation, Hamburg, N. J.	435
*Polan Industries, Inc., Huntington 19, W. Va.	621
Polarad Electronics Corporation, Long Island City 1, N. Y.	562
Precision Apparatus Company, Inc., Glendale 27, Long Island, N. Y.	505
Precision Coil Manufacturing Company, Santa Monica, Calif.	982
Precision Electronics Inc., Franklin Park, Ill.	871
*R. Prescott & Son, Inc., Keeseville, N. Y.	356
Presto Recording Company, Sub. Unitronics Corporation, Paramus, N. J.	1027
Premax Products Division, Chisholm-Ryder Co., Inc., Niagara Falls, N. Y.	267
Prodelin, Inc., Kearny, N. J.	703
*Pyramid Electric Company, North Bergen, N. J.	472
*Q. L. C. Corporation, Summit, N. J.	464
*Quality Transformer & Coil Co., Inc., Chicago 14, Ill.	1005
Quam-Nichols Company, Chicago 37, Ill.	270
Quincy Speaker Manufacturing Corp., Quincy, Ill.	767
Rada Products Co., Chicago 12, Illinois	482
Radio Condenser Company, Camden 3, N. J.	273
Radio Corporation of America, Camden, N. J.	274
Radio Development & Research Corp., Paterson 3, N. J.	924
Radio Engineering Laboratories, Inc., Long Island City 1, N. Y.	276

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Company	Code No.
*Radio Industries, Inc., Chicago 40, Ill.	540
Radio Materials Corporation, Chicago 18, Ill.	732
*The Radion Corporation, Chicago 14, Ill.	700
*Radio Receptor Company, Inc., New York 11, N. Y.	380
Radio Specialty Manufacturing Co., Portland 14, Oregon	587
*Radio Television Products Corp., Grass Lake, Mich.	489
The Radix Wire Company, Euclid 32, Ohio	948
RAM Electronics, Inc., Irvington-on-Hudson, N. Y.	617
Rapid Die and Molding Co., Schiller Park, Ill.	968
*Ratel, Inc., Goleta, Calif.	835
Ratigan Electronics Inc., Los Angeles 11, Calif.	979
Raytheon Manufacturing Company, Waltham 54, Mass.	280
Rea Magnet Wire Company, Inc., Fort Wayne 4, Ind.	281
Rectifier Corporation, Fajardo, Puerto Rico	844
Red Bank Division, Bendix Aviation Corp., Eatontown, N. J.	1012
*Red Lion Cabinet Company, Red Lion, Pa.	384
Remler Company, San Francisco 10, Calif.	284
Resitron Laboratories, Inc., Santa Monica, Calif.	917
Rhein Sound Systems, Inc., Marion, Ill.	952
Richardson Company, Hollywood 28, Calif.	919
Robertshaw-Fulton Controls Co., Aeronautical Division, Anaheim, Calif.	1008
*Rogers Electronic Corp., New York 12, N. Y.	677
The Rola Company, Inc., Div. of The Muter Company, Cleveland 14, Ohio	285
*Rollan Electric Co., Chicago 20, Ill.	721
The Ross Manufacturing Company, Chicago 40, Ill.	286
*Russell Speaker Company, Chicago 21, Ill.	748
S & A Electronics, Toledo 5, Ohio	872
*Sampson Electric Products Co., Clinton, N. C.	518
San Fernando Electric Mfg. Co., San Fernando, Calif.	815
Sangamo Electric Company, Electronic Components Division, Springfield, Ill.	658
*Santay Corporation, Chicago 24, Ill.	368
Sarkes Tarzian, Inc., Bloomington, Ind.	684
Schneider & Marquard, Inc., Brooklyn 17, N. Y.	520
*Schulmerich Electronics, Inc., Sellersville, Penna.	428
Scientific Radio Products, Inc., Omaha 8, Nebr.	953
J. P. Seeburg Corporation, Chicago 22, Ill.	289
Sentinel Radio Company, Sub. Magnavox Company, Evanston, Ill.	291
Sheffco Mfg. Corp., Fairview, N. J.	698
*Sherold Crystals Inc., Kansas City 8, Mo.	975
Shure Brothers, Inc., Evanston, Ill.	590
Shurite Meters (J-B-T Instruments, Inc.), New Haven 8, Conn.	484
F. W. Sickles Division, General Instrument Corp., Chicopee, Mass.	294
Simpson Electric Company, Chicago 44, Ill.	614
*Mark Simpson Manufacturing Co., Inc., Long Island City 3, N. Y.	295
Skiatron Electronics & Television Corp., New York 14, N. Y.	931
*Solar Manufacturing Corporation, Los Angeles 58, Calif.	296
*Sonora Radio & Television Corp., Chicago 12, Ill.	297
*Sonotone Corporation, Elmsford, N. Y.	787
Soundolier, Inc., St. Louis 22, Mo.	1026
Southern Electronics Company, Greeneville, Tenn.	891
*Sparton Electronics Division, The Sparks-Withington Company, Jackson, Mich.	299
Special Products Company, Rockville, Md.	474
Speer Resistor Division, Speer Carbon Company, St. Marys, Penna.	300
Spencer Kennedy Laboratories, Inc., Boston 35, Mass.	782
*Sperti Faraday Inc., Cincinnati 2, Ohio	302
Sprague Electric Company, North Adams, Mass.	303
Sprague of Wisconsin, Inc., Grafton, Wis.	457
Stackpole Carbon Company, St. Marys 3, Pa.	304
*Standard Coil Products Co. Inc., Melrose Park, Ill.	305
*Standard Condenser Corp., Chicago 13, Ill.	710
Standard Crystal Company, Kansas City 8, Mo.	995
*Standard Electrical Products Co., Dayton 3, Ohio	668
Standard Electronics Corporation, Sub. of Dynamics Corp. of America, Newark 5, N. J.	694
Standard Electronics, Division of Hupp Corp., Carlisle, Pa.	501
Standard Television Tube Corp., New Orleans 12, La.	922
*Standard Winding Company, Newburgh, N. Y.	550
*Stanwyck Winding Company, Newburgh, N. Y.	574
The Staver Company Incorporated, Bay Shore, L. I.	604
Stewart-Warner Electronics, Div. of Stewart-Warner Corporation, Chicago 51, Ill.	307
*Stoddart Aircraft Radio Co., Hollywood 38, Calif.	369
Stone City Machine & Tool Co., Inc., Bedford, Ind.	770
Stromberg-Carlson Company, Div. of General Dynamics Corp., Rochester 3, N. Y.	308
*Stupakoff Ceramic & Mfg. Co., Latrobe, Penna.	309
Superior Tube Company, Norristown, Pa.	310
*Supreme Transformer Corporation, Chicago 39, Ill.	798
Surprenant Mfg. Co., Boston 8, Mass.	624
Switchcraft, Inc., Chicago 22, Ill.	1000
Sylvania Electric Products Inc., New York 19, N. Y.	312
*Symphonic Radio and Electronic Corp., New Brunswick, N. J.	351
*Syntronic Instruments, Inc., Addison, Ill.	822
Talk-A-Phone Co., Chicago 23, Ill.	132
Tansitor Electronics, Inc., Bennington, Vt.	988
Taylor Tubes, Inc., Chicago 47, Ill.	713
*Tech-Master Corporation, Brooklyn 1, N. Y.	679
*Technical Appliance Corp., Sherburne, N. Y.	737
Technical Training Institute, Portland 11, Ore.	921
TelAutograph Corporation, Los Angeles 45, Calif.	970
Telechrome Incorporated, Amityville, N. Y.	868
*Tele King Corporation, New York 1, N. Y.	583
*Telequip Radio Company, Chicago 8, Ill.	454
*Teleradio Engineering Corporation, Wilkes Barre, Pa.	357
Televideo Corporation of America, Los Angeles 12, Calif.	962
*Tele-Ray Tube Co., Inc., Yonkers, N. Y.	864
*Tel-O-Tube Corporation of America, East Paterson, N. J.	818
*Televideo Corporation of America, Los Angeles 18, Calif.	962
*TELvision Laboratories, Inc., Wauconda, Ill.	608
*Tempel Manufacturing Company, Chicago 26, Ill.	745
Tempo T.V. Mfg. Corp., Canoga Park, Calif.	802
The Tetrad Company, Yonkers 2, N. Y.	842
Texas Electronics Mfg. Co., Houston, Tex.	916
Texas Instruments Incorporated, Dallas 9, Tex.	980
*Thermador Electrical Mfg. Co., Los Angeles 22, Calif.	825
*Thomas & Skinner Steel Products Co., Indianapolis 7, Ind.	318
Thomas Electronics, Inc., Passaic, N. J.	672
*Thordarson-Meissner, Mt. Carmel, Ill.	238
*Todd Electric Company, Inc., Yonkers, N. Y.	826
*Todd Products Co., Inc., Mt. Vernon, N. Y.	634
*Todd-Tran Corp., Mt. Vernon, N. Y.	635
*B. J. Toegel, Inc., Plainfield, N. J.	548
*Torwico Electronics, Inc., Union, N. J.	1025
*Trad Electronics Corporation, Asbury Park, N. J.	688
*Transitron Electronic Corporation, Melrose 76, Mass.	959
Translite Electronics Corp., Chicago 39, Ill.	810
Trav-Ler Radio Corporation, Chicago 6, Ill.	320
Tresco, Inc., Philadelphia 28, Penna.	897
*Triad Transformer Corporation, Venice, Calif.	830
Triplett Electrical Instrument Co., Bluffton, Ohio	321
*Triwec-Transformer Company, Chicago 18, Ill.	524
Tung-Sol Electric Inc., Newark 4, N. J.	322
*TV Products Division, Union Electric & Mfg. Co. Jersey City 7, N. J.	618
*The Ucinite Company, Newtonville 60, Mass.	381
Union City Filament Corp., Union City, N. J.	954
*Union Electric & Manufacturing Co., Jersey City 7, N. J.	804
United Condenser Corporation, New York 56, N. Y.	516
United Electronics Company, Newark 4, N. J.	323
*United Electronic Manufacturing Corp., Union City, N. J.	820
United States Dynamics Corporation, Boston 20, Mass.	997
*United States Radium Corporation, New York 7, N. Y.	324
*United Transformer Corporation, New York 13, N. Y.	418
*Unitek Corporation, Pasadena 8, Calif.	881
Universal Company, High Point, N. C.	756
University Loudspeakers, Inc., White Plains, N. Y.	847
*Utah Radio Products Co., Inc., Huntington, Ind.	328
Vacuum Tube Products Co., Inc., Oceanside, Calif.	781
Valpey Crystal Corporation, Holliston, Mass.	527
Varian Associates, Palo Alto, Calif.	809
Vector Electronic Company, Los Angeles 65, Calif.	971
Vidaire Electronics Mfg. Co., Lynbrook, L. I., N. Y.	797
*Videocraft Manufacturing Co., Chicago 39, Ill.	824
Viking Industries, Inc., Canoga Park, Calif.	896
Vitramon, Inc., Bridgeport 1, Conn.	956
*V-M Corporation, Benton Harbor, Mich.	857
Vokar Corporation, Dexter, Mich.	168
Volkert Stampings, Inc., Queens Village 29, L. I., N. Y.	507
Walsco Electronics Corporation, Los Angeles 16, Calif.	287
*Ward Leonard Electric Co., Mount Vernon, N. Y.	532
*Ward Products Corporation, Division of The Gabriel Company, Cleveland 15, Ohio	331
Warwick Manufacturing Corporation, Chicago 44, Ill.	332
Waterman Products Company, Inc., Philadelphia 25, Pa.	431
Waters Conley Company, Inc., Rochester, Minn.	382
Weber Aircraft Corporation, Burbank, Calif.	1009
*WEBCOR, Inc., Chicago 39, Ill.	375
Weller Electric Corporation, Easton, Pa.	662
Wells-Gardner & Co., Chicago 39, Ill.	334
Wm. H. Welsh Co., Inc., Chicago 16, Ill.	335
Western Electric Company, Inc., New York 5, N. Y.	336

Company	Code No.
Westinghouse Electric Corporation, Baltimore 3, Md.	337
Weston Electrical Instrument Corp., Newark 5, N. J.	338
*The Wheeler Insulated Wire Company, Inc., Waterbury 20, Conn.	392
Wheeler Laboratories, Inc., Great Neck, N. Y.	529
*Whitewater Electronics Inc., Whitewater, Wis.	758
*Wilcox Electric Company, Inc., Kansas City 27, Mo.	339
Wind Turbine Company, West Chester, Pa.	653
Winston Electronics, Inc., Philadelphia 27, Pa.	957
Wire Company of America, Santa Barbara, Calif.	890
*Wirt Company, Philadelphia 44, Penna.	406
W. M. C. Inc., Chicago 47, Ill.	584
*Woodward-Schumacher Electric Corp., Chicago 22, Ill.	606
*Worthco Corporation, Beverly Hills, Calif.	785
Wright Zimmerman, Inc., New Brighton, Minn.	683
The Yale & Towne Manufacturing Co., Powdered Metal Products Division, Franklin Park, Ill.	539
*The Zell Products Corp., Norwalk, Conn.	342
Zenith Radio Corporation, Chicago 39, Ill.	343
Z & W Mfg. Corp., Wickliffe, Ohio	819

NUMERICAL LIST

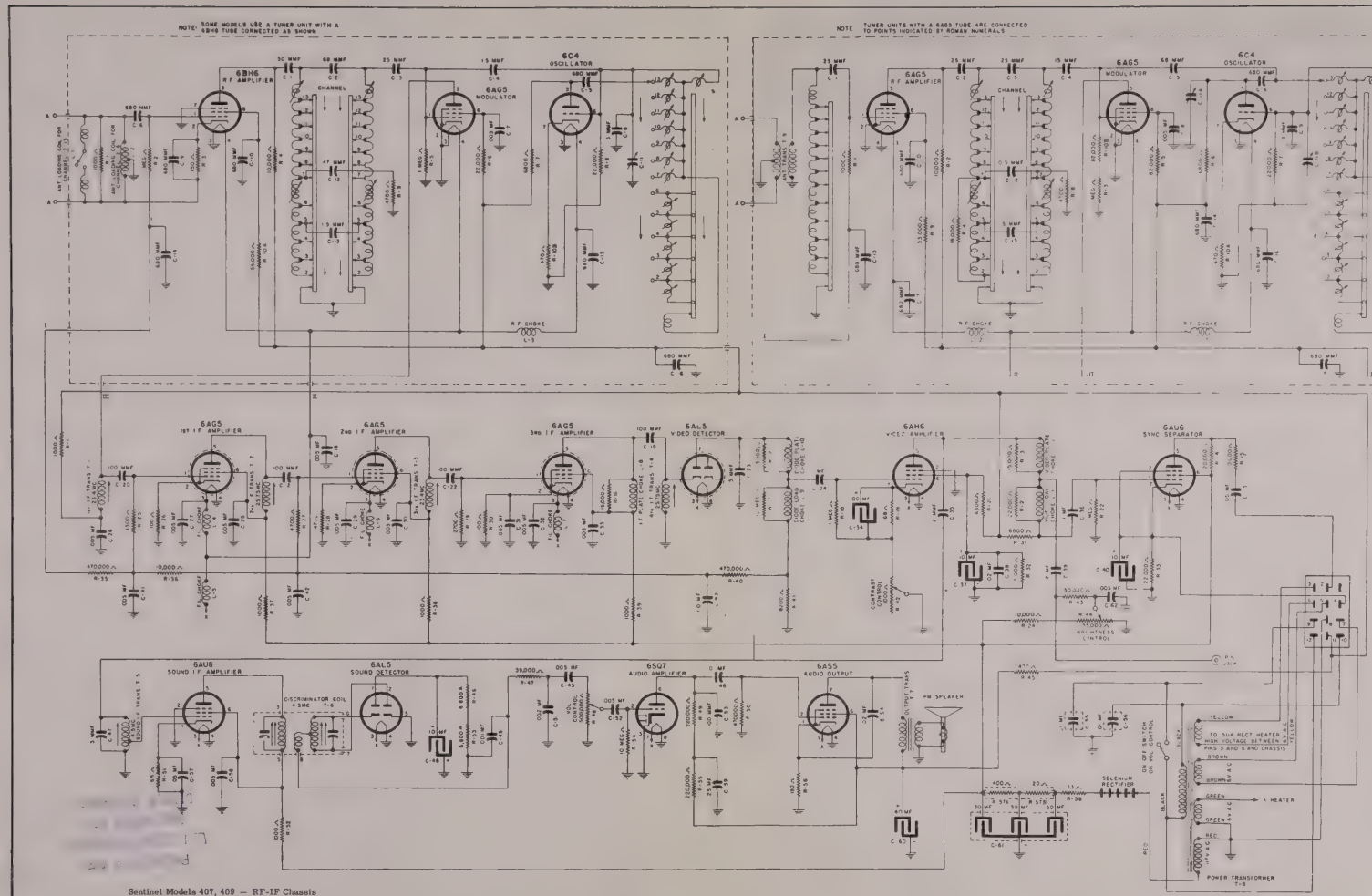
Code No.	Company
1	*Fastex Division, Illinois Tool Works, Des Plaines, Ill.
101	*Admiral Corporation, Chicago 47, Ill.
102	Aerovox Corporation, New Bedford, Mass.
105	CBS-Columbia, Division of Columbia Broadcasting System, Inc., Long Island City 1, N. Y.
106	Allen-Bradley Company, Milwaukee 4, Wis.
107	The Alliance Manufacturing Co., Inc., Alliance, Ohio
109	American Condenser Corporation, Chicago 40, Ill.
110	All Star Products, Inc., Defiance, Ohio
111	Amperex Electronic Corporation, Hicksville, L. I., N. Y.
113	*Andrea Radio Corporation, Long Island City 1, N. Y.
115	A. R. F. Products, Inc., River Forest, Ill.
116	The Arnold Engineering Company, Sub. of Allegheny Ludlum Steel Corp., Marengo, Ill.
119	Automatic Manufacturing Division, General Instrument Corp., Newark 4, N. J.
120	Automatic Radio Mfg. Co., Inc., Boston 15, Mass.
122	The Bead Chain Manufacturing Co., Bridgeport 5, Conn.
125	Bendix Radio, Division of Bendix Aviation Corporation, Baltimore 4, Md.
128	Bliley Electric Company, Erie, Pa.
132	Talk-A-Phone Co., Chicago 23, Ill.
133	C. F. Cannon Co., Springwater, N. Y.
134	Centralab, Div. of Globe-Union Inc., Milwaukee 1, Wis.
135	Chicago Condenser Corporation, Chicago 47, Ill.
137	Chicago Telephone Supply Corp., Elkhart, Ind.
138	*Chicago Standard Transformer Division, Essex Wire Corp., Chicago 18, Ill.
139	Cinch Manufacturing Corporation, Chicago 24, Ill.
140	Clarostat Mfg. Co., Inc., Dover, New Hampshire
141	*Coil Engineering & Mfg. Co., Inc., Roanoke, Ind.
145	*Consolidated Radio Products Co., Chicago 10, Ill.
146	Continental Carbon, Div. of Wirt Company, Cleveland 11, Ohio
147	Continental Electric Company, Chicago 2, Ill.
148	Corning Glass Works, Corning, N. Y.
149	Cornish Wire Company, Inc., New York 7, N. Y.
150	*Crescent Industries, Inc., Chicago 31, Ill.
151	Croname, Incorporated, Chicago 13, Ill.
152	Crosley Radio and Television Division, Avco Manufacturing Corporation, Cincinnati 25, Ohio
154	*Tobe Deutschmann Corporation, Norwood, Mass.
155	DeWald Radio Mfg. Corp., Long Island City 1, N. Y.
156	Wilbur B. Driver Company, Newark 4, N. J.
157	*Dumont-Airplane & Marine Instruments, Inc., New York 5, N. Y.
158	Allen B. DuMont Laboratories, Inc., Clifton, N. J.
159	*DX Radio Products Company, Inc., Chicago 47, Ill.
160	*Hugh H. Eby Company, Philadelphia 44, Penna.
161	Eckstein Radio & Television Co., Minneapolis 6, Minn.
162	Eitel-McCullough, Inc., San Bruno, Calif.
163	Hi-Q Division Aerovox Corporation, Olean, N. Y.
164	The Electro Motive Mfg. Co., Inc., Willimantic, Conn.
166	*Chicago Electronic Engineering Co., Chicago 47, Ill.
168	Vokar Corporation, Dexter, Michigan
169	*Electronic Specialty Co., Los Angeles 39, Calif.
170	Electronic Tube Corporation, Philadelphia 18, Pa.
171	Emerson Radio & Phonograph Corp., Jersey City 2, N. J.
172	Ensign Coil Company, Chicago 23, Ill.
173	Erie Resistor Corporation, Erie, Pa.
177	Capehart-Farnsworth Company, Fort Wayne 1, Ind.
178	John E. Fast & Company, Chicago 18, Ill.
179	Federal Telephone and Radio Company, Clifton, N. J.
185	Motorola Inc., Chicago 51, Ill.
187	*Gates Radio Company, Quincy, Ill.
188	General Electric Company, Syracuse 1, N. Y.
189	*General Electronics, Division of Arcturus Electronics Inc., Paterson 3, N. J.
190	The General Industries Company, Elyria, Ohio
191	General Instrument Corporation, Newark 4, N. J.
193	General Magnetic Corporation, Detroit 34, Mich.
194	General Radio Company, Cambridge 39, Mass.
197	The Fred Goat Co., Inc., Brooklyn 17, N. Y.
198	*Guthman Division, Essex Wire Corp., Chicago 7, Ill.
199	The Hallicrafters Company, Chicago 24, Ill.
200	Olympic Radio & Television, Div. Unitronics Corp., Long Island City 1, N. Y.
201	Hammarlund Mfg. Co., Inc., New York 1, N. Y.
204	Hawley Products Company, St. Charles, Ill.
205	Haydu Electronic Products, Inc., Plainfield, N. J.
207	Hoffman Electronics Corporation, Los Angeles 7, Calif.
210	CBS-Hytron, Division of Columbia Broadcasting System, Inc., Danvers, Mass.
211	The Indiana Steel Products Company, Valparaiso, Ind.
214	International Resistance Company, Philadelphia 8, Pa.
216	Jackson Electrical Instrument Co., Dayton 2, Ohio
218	*Jefferson Electric Company, Bellwood, Ill.
219	Jefferson-Travis Incorporated, Sub. Emerson Radio & Phonograph Corp., Brooklyn, N. Y.
220	Jensen Manufacturing Company, Div. of The Muter Company, Chicago 38, Ill.
221	JFD Manufacturing Co., Inc., Brooklyn 4, N. Y.
222	E. F. Johnson Company, Waseca, Minn.
223	Kerrigan Lewis Manufacturing Co., Chicago 51, Ill.
224	Kester Solder Company, Chicago 39, Ill.
225	King Laboratories, Inc., Syracuse 3, N. Y.
227	*Lear, Incorporated, Los Angeles 64, Calif.
228	Lenz Electric Manufacturing Co., Chicago 47, Ill.
230	Littelfuse, Incorporated, Des Plaines, Ill.
231	Machlett Laboratories, Incorporated, Springdale, Conn.
232	The Magnavox Company, Fort Wayne 4, Ind.
235	P. R. Mallory & Co., Inc., Indianapolis 6, Ind.
236	Measurements Corporation, Boonton, N. J.
238	*Thordarson-Meissner, Mt. Carmel, Ill.
239	*Merit Coil & Transformer Corp., Chicago 40, Ill.
240	Micamold Electronics Manufacturing Corp., Sub. General Instrument Corp., Brooklyn 37, N. Y.
242	James Millen Manufacturing Co., Inc., Malden 48, Mass.
244	The Muter Company, Chicago 5, Ill.
245	*National Company, Inc., Malden 48, Mass
246	National Fabricated Products, Div. of Hoffman Electronics Corp., Chicago 47, Ill.
248	Arvin Industries, Inc., Columbus, Ind.
249	Oak Mfg. Co., Chicago 10, Ill.
250	The Ohio Carbon Company, Cleveland 11, Ohio
251	Ohmite Manufacturing Company, Skokie, Ill.
252	DuKane Corporation, St. Charles, Ill.
254	Packard-Bell Electronics Corp., Los Angeles 64, Calif.
257	Parisian Novelty Company, Chicago 9, Ill.
259	Permo, Incorporated, Chicago 26, Ill.
260	Philco Corporation, Philadelphia 34, Pa.
262	*Philmore Manufacturing Co., Inc., New York 3, N. Y.
264	Pilot Radio Corporation, Long Island City 1, N. Y.
267	Premax Products Division, Chisholm-Ryder Co., Inc., Niagara Falls, N. Y.
270	Quam-Nichols Company, Chicago 37, Ill.
273	Radio Condenser Company, Camden 3, N. J.
274	Radio Corporation of America, Camden, N. J.
276	Radio Engineering Laboratories, Inc., Long Island City 1, N. Y.
280	Raytheon Manufacturing Company, Waltham 54, Mass.
281	Rea Magnet Wire Company, Inc., Fort Wayne 4, Ind.
284	Remler Company, San Francisco 10, Calif.
285	The Rola Company, Inc., Div. of The Muter Company, Cleveland 14, Ohio
286	The Ross Manufacturing Company, Chicago 40, Ill.
287	Walsco Electronics Corporation, Los Angeles 16, Calif.
289	J. P. Seeburg Corporation, Chicago 22, Ill.
291	Sentinel Radio Company, Sub. Magnavox Company, Evanston, Ill.
294	F. W. Sickles Division, General Instrument Corp., Chicopee, Mass.
295	*Mark Simpson Manufacturing Co., Inc. Long Island City 3, N. Y.
296	*Solar Manufacturing Corporation, Los Angeles 58, Calif.
297	*Sonora Radio & Television Corp., Chicago 12, Ill.
299	*Sparton Electronics Division, The Sparks-Withington Company, Jackson, Mich.
300	Speer Resistor Corporation, Saint Marys, Pa.

Code No.	Company
302	*Sperti Faraday Inc., Cincinnati 2, Ohio
303	Sprague Electric Company, North Adams, Mass.
304	Stackpole Carbon Company, St. Marys 3, Pa.
305	*Standard Coil Products Co. Inc., Melrose Park, Ill.
307	Stewart-Warner Electronics, Div. of Stewart-Warner Corporation, Chicago 51, Ill.
308	Stromberg-Carlson Company, Div. of General Dynamics Corp., Rochester 3, N. Y.
309	*Stupakoff Ceramic & Mfg. Co., Latrobe, Penna.
310	Superior Tube Company, Norristown, Pa.
312	Sylvania Electric Products Inc., New York 19, N. Y.
318	*Thomas & Skinner Steel Products Co., Indianapolis 7, Ind.
320	Trav-Ler Radio Corporation, Chicago 6, Ill.
321	Triplett Electrical Instrument Co., Bluffton, Ohio
322	Tung-Sol Electric Inc., Newark 4, N. J.
323	United Electronics Company, Newark 4, N. J.
324	*United States Radium Corporation, New York 7, N. Y.
328	*Utah Radio Products Co., Inc., Huntington, Ind.
331	*Ward Products Corporation, Division of The Gabriel Company, Cleveland 15, Ohio
332	Warwick Manufacturing Corporation, Chicago 44, Ill.
334	Wells-Gardner & Co., Chicago 39, Ill.
335	Wm. H. Welsh Co., Inc., Chicago 16, Ill.
336	Western Electric Company, Inc., New York 5, N. Y.
337	Westinghouse Electric Corporation, Baltimore 3, Md.
338	Weston Electrical Instrument Corp., Newark 5, N. J.
339	*Wilcox Electric Company, Inc., Kansas City 27, Mo.
342	*The Zell Products Corp., Norwalk, Conn.
343	Zenith Radio Corporation, Chicago 39, Ill.
345	*The Astatic Corporation, Conneaut, Ohio
351	*Symphonic Radio and Electronic Corp., New Brunswick, N. J.
352	*Magnetic Windings Division, Essex Wire Corporation, Easton, Penna.
356	*R. Prescott & Son, Inc., Keeseville, N. Y.
357	*Teleradio Engineering Corporation, Wilkes Barre, Pa.
360	*Gavitt Wire & Cable Co., Division of American Hard Rubber Co., Brookfield, Mass.
366	New York Transformer Co., Inc., Alpha, N. J.
367	National Moldite Company, Hillside 5, N. J.
368	*Santay Corporation, Chicago 24, Ill.
369	*Stoddart Aircraft Radio Co., Hollywood 38, Calif
370	*Carr Fastener Company, Division of United-Carr Fastener Corp., Cambridge 42, Mass.
371	*Best Manufacturing Co., Inc., Irvington 11, N. J.
372	*Holyoke Wire and Cable Corporation, Holyoke, Mass.
375	*WEBCOR, Inc., Chicago 39, Ill.
380	*Radio Receptor Company, Inc., New York 11, N. Y.
381	*The Ucinite Company, Newtonville 60, Mass.
382	Waters Conley Company, Inc., Rochester, Minn.
384	*Red Lion Cabinet Company, Red Lion, Pa.
385	*Dearborn Glass Company, Bedford Park, Ill.
391	Altec Lansing Corporation, Beverly Hills, Calif.
392	*The Wheeler Insulated Wire Company, Inc., Waterbury, 20, Conn.
394	*Foster Transformer Company, Cincinnati 23, Ohio
396	General Cement Mfg. Co., Div. Textron, Inc., Rockford, Ill.
397	*Gabriel Electronics Division, The Gabriel Company, Norwood, Mass.
402	Andrew Corporation, Chicago 19, Ill.
406	*Wirt Company, Philadelphia 44, Penna.
409	British Industries Corporation, Port Washington, L. I., N. Y.
411	Hardwick, Hindle, Inc., Newark 5, N. J.
412	*General Transformer Company, Homewood, Ill.
413	*Acme Electric Corporation, Cuba, N. Y.
418	*United Transformer Corporation, New York 13, N. Y.
423	North American Philips Company, Inc., New York 17, N. Y.
425	*Essex Electronics, Berkeley Heights, N. J.
427	Communication Measurements Laboratory, Inc., Plainfield, N. J.
428	*Schulmerich Electronics, Inc., Sellersville, Penna.
431	Waterman Products Company, Inc., Philadelphia 25, Pa.
433	*Cleveland Electronics, Inc., Cleveland 3, Ohio
435	*Plastoid Corporation, Hamburg, N. J.
437	*Newcomb Electronics Corporation, Hollywood 38, Calif.
438	The Gudeman Company, Chicago 10, Ill.
439	Collins Radio Company, Cedar Rapids, Ia.
442	J-B-T Instruments, Inc., New Haven 8, Conn.
446	Good-All Electric Mfg. Co., Ogallala, Nebr.
450	*Columbus Process Co., Inc., Columbus, Ind.
454	*Telequip Radio Company, Chicago 8, Ill.
457	Sprague of Wisconsin, Inc., Grafton, Wis.
459	*General Communication Company, Boston 15, Mass.
461	Barker & Williamson, Inc., Upper Darby, Pa.
464	*Q. L. C. Corporation, Summit, N. J.
465	Oxford Electric Corporation, Chicago 15, Ill.
466	Delco Radio Division, General Motors Corporation, Kokomo, Ind.
467	Grigsby-Allison Company, Inc., Arlington Heights, Ill
472	*Pyramid Electric Company, North Bergen, N. J.
474	Special Products Company, Rockville, Md.
475	*Glass Products Company, Chicago 37, Ill.
482	Rada Products Co., Chicago 12, Ill.
484	*Shurite Meters (J-B-T Instruments, Inc.), New Haven 8, Conn.
489	*Radio Television Products Corp., Grass Lake, Mich.
493	*Dormitzer Electric & Manufacturing Co. Inc., Cambridge 40, Mass.
494	Fidelity Products Co., Inc., So. Orange, N. J.
501	*Hupp Electronics Co., Forest Park, Ill.
502	*American Radio Hardware Co., Inc., Mt. Vernon, N. Y.
503	Caledonia Electronics & Transformer Corp., Caledonia, N. Y.
504	*The James Knights Company, Sandwich, Ill.
505	Precision Apparatus Company, Inc., Glendale 27, Long Island, N. Y.
507	Volkert Stampings, Inc., Queens Village 29, L. I., N. Y.
508	The Hickok Electrical Instrument Co., Cleveland 8, O.
514	*Audio Electric Company, Chicago 26, Ill.
515	*Electronic Components Corporation, Chicago 8, Ill.
516	United Condenser Corporation, New York 56, N. Y.
518	*Sampson Electric Products Co., Clinton, N. C.
520	Schneider & Marquard, Inc., Brooklyn 17, N. Y.
524	*Triwec Transformer Company, Chicago 18, Ill.
525	Crucible Steel Company of America, New York 17, N. Y.
527	Valpey Crystal Corporation, Holliston, Mass.
529	Wheeler Laboratories, Inc., Great Neck, N. Y.
530	*Clippard Instrument Laboratory, Inc., Cincinnati 31, Ohio
532	*Ward Leonard Electric Co., Mount Vernon, N. Y.
539	The Yale & Towne Manufacturing Co., Powdered Metal Products Division, Franklin Park, Ill.
540	*Radio Industries, Inc., Chicago 40, Ill.
547	*Anaconda Wire & Cable Company, Hastings-On-Hudson 6, N. Y.
548	*B. J. Toegel, Inc., Plainfield, N. J.
549	*Mid-West Coil & Transformer Co., Chicago 14, Ill.
550	*Standard Winding Company, Newburgh, N. Y.
551	American Television & Radio Co., St. Paul 1, Minn.
552	Otis Radio & Electric Corp., Hawarden, Iowa
554	Amphenol Electronics Corporation, Chicago 50, Ill.
562	Polarad Electronics Corporation, Long Island City 1, N. Y.
563	J. W. Davis & Company, Dallas 9, Texas
569	*Electrical Utilities Company, La Salle, Ill.
570	*Leonard Electric Products Co., Inc., Brooklyn 32, N. Y.
571	*General Cable Corporation, Perth Amboy, N. J.
572	*F. & V. Coil Winding Corporation, Newark 5, N. J.
573	Alcon Metal Products, Inc., Chicago 47, Ill.
574	*Stanwyck Winding Company, Newburgh, N. Y.
575	*Heppner Manufacturing Company, Round Lake, Ill.
579	Belden Manufacturing Company, Chicago 44, Ill.
582	*General Precision Laboratory Inc., Pleasantville, N. Y.
583	*Tele King Corporation, New York 1, N. Y.
584	W. M. C. Inc., Chicago 47, Ill.
586	Drake Manufacturing Company, Chicago 22, Ill.
587	Radio Specialty Manufacturing Co., Portland 14, Ore.
588	Barnes Metal Products Company, Chicago 23, Ill.
589	David Bogen Co., Inc., Sub. Unitronics Corp., Paramus, N. J.
590	Shure Brothers, Inc., Evanston, Ill.
592	*Perfection Electric Company, Chicago 16, Ill.
593	Kip Electronics Corporation, Stamford, Conn.
594	*Kobzy Tool Company, Chicago 22, Ill.
596	*Gramer-Halldorson Transformer Corp., Chicago 39, Ill.
599	*Elco Corporation, Philadelphia 24, Penna.
601	*Engineering Services, Inc., Evansville 4, Ind.
603	Eltran Corporation, St. Anne, Ill.
604	The Staver Company Incorporated, Bay Shore, L. I.
606	*Woodward-Schumacher Electric Corp., Chicago 22, Ill.
607	Consolidated Wire & Associated Companies, Chicago 16, Ill.
608	*TELvision Laboratories, Inc., Wauconda, Ill.
610	Carter Parts Company, Chicago 10, Ill.
614	Simpson Electric Company, Chicago 44, Ill.
616	*Illinois Condenser Company, Chicago 22, Ill.
617	RAM Electronics, Inc., Irvington-On-Hudson, N. Y.
618	*TV Products Division, Union Electric & Mfg. Co., Jersey City 7, N. J.
620	Kay Electric Company, Pine Brook, N. J.
621	*Polan Industries, Inc., Huntington 19, W. Va.
624	Surprenant Mfg. Co., Boston 8, Mass.
628	*Davis Electric Company, Cape Girardeau, Mo.
631	*Pickering and Company, Inc., Oceanside, N. Y.
632	*El-Rad Manufacturing Co., Chicago 18, Ill.
634	*Todd Products Co., Inc., Mt. Vernon, N. Y.
635	*Todd-Tran Corp., Mt. Vernon, N. Y.
637	*Central Coil Company, Indianapolis 22, Ind.

Code No.	Company
638	Industrial Development Engineering Associates, Inc., Indianapolis 26, Ind.
639	Johnson & Hoffman Mfg. Corp., Sub. Superior Tube Company, Mineola, N. Y.
642	Mycalex Corporation of America, Clifton, N. J.
643	National Aeronautical Corporation, Ambler, Pa.
644	General Railway Signal Company, Rochester 2, N. Y.
647	Kimble Glass Company, Sub. of Owens-Illinois Glass Co., Toledo 1, Ohio
648	*American Radionic Co., Inc., Danbury, Conn.
649	Electro-Voice, Inc., Buchanan, Michigan
653	Wind Turbine Company, West Chester, Pa.
657	Lowell Manufacturing Company, St. Louis 17, Mo.
658	Sangamo Electric Company, Electronic Components Division, Springfield, Ill.
662	Weller Electric Corporation, Easton, Pa.
665	Penn Tran Corporation, Bellefonte, Penna.
668	*Standard Electrical Products Co., Dayton 3, Ohio
670	Glaser-Steers Corporation, Belleville 9, N. J.
671	*Lytle Engineering & Mfg. Co., Chicago 3, Ill.
672	Thomas Electronics, Inc., Passaic, N. J.
677	*Rogers Electronic Corp., New York 12, N. Y.
679	*Tech-Master Corporation, Brooklyn 1, N. Y.
680	Conrac, Incorporated, Glendora, Calif.
681	*American Lava Corporation. Chattanooga 5, Tenn.
682	*Electrical Windings, Inc., Chicago 39, Ill.
683	Wright Zimmerman, Inc., New Brighton, Minn.
684	Sarkes Tarzian, Inc., Bloomington, Ind.
686	H. S. Martin & Company, Evanston, Ill.
687	*Hillburn Electronic Products Co., Brooklyn 22, N. Y.
688	*Trad Electronics Corporation, Asbury Park, N. J.
689	Aladdin Electronics, a Division of Aladdin Industries, Incorporated, Nashville 10, Tenn.
692	CELCO (Constantine Engineering Laboratories Co.), Mahwah, N. J.
693	Multi-Tron Laboratory, Inc., Chicago 44, Ill.
694	Standard Electronics Corporation, Sub. of Dynamics Corp. of America, Newark 5, N. J.
695	Basler Electric Company, Highland, Ill.
697	*Phalo Plastics Corporation, Worcester 8, Mass.
698	Sheffco Mfg. Corp., Fairview, N. J.
699	Keystone Electronics Company, Newark 4, N. J.
700	*The Radion Corporation, Chicago 14, Ill.
701	Forbes & Wagner, Inc., Silver Creek, N. Y.
703	Prodelin, Inc., Kearny, N. J.
704	Cosmic Radio Corporation, New York 59, N. Y.
705	*Ajax Condenser Co., Inc., Chicago 14, Ill.
706	Pioneer Electronics Corporation, Los Angeles 64, Calif.
708	Bell Sound Systems, Inc., Columbus 7, Ohio
710	*Standard Condenser Corp., Chicago 13, Ill.
711	*Controls Company of America, Schiller Park, Ill.
719	*Carbonneau Industries, Grand Rapids 2, Mich.
720	Methode Manufacturing Corp., Chicago 47, Ill.
721	*Rollan Electric Co., Chicago 20, Ill.
722	Milwaukee Resistor Co., Milwaukee 4, Wis.
723	Northwest Plastics, Inc., St. Paul 1, Minn.
724	Jeffers Electronics Division, Speer Carbon Company, Dubois, Penna.
726	Penn Television Products Co., Philadelphia 34, Pa.
730	Jersey Specialty Co., Inc., Mountainview, N. J.
732	Radio Materials Corporation, Chicago 13, Ill.
733	Alpha Metals, Inc., Jersey City 4, N. J.
734	Fretco Incorporated, Pittsburgh 13, Penna.
736	*Paul & Beekman, Inc., Philadelphia 40, Pa.
737	*Technical Appliance Corp., Sherburne, N. Y.
738	*Lewis and Kaufman, Ltd., Los Gatos, Calif.
739	Oak Electronics Company, Buffalo 3, N. Y.
740	Olympic Products Co., Inc., Alpha 1, N. J.
742	*Esquire Radio Corporation, Brooklyn 19, N. Y.
744	Hughes Aircraft Company, Culver City, Calif.
745	*Tempel Manufacturing Company, Chicago 26, Ill.
746	*L. H. Frost & Co., Inc., Grand Rapids 8, Mich.
748	*Russell Speaker Company, Chicago 21, Ill.
749	*National Electronics, Incorporated, Geneva, Ill.
750	Mosley Electronics, Incorporated, St. Louis 14, Mo.
752	Electronic Devices, Inc., Brooklyn 15, N. Y.
756	Universal Company, High Point, N. C.
757	*Grand Transformers, Inc., Grand Haven, Mich.
758	*Whitewater Electronics Inc., Whitewater, Wis.
761	*Planet Manufacturing Corp., Bloomfield, N. J.
762	Erca Tool Die & Stamping Co., Brooklyn 22, N. Y.
767	Quincy Speaker Manufacturing Corp., Quincy, Ill.
768	Microtran Company, Inc., Valley Stream, L. I., N. Y.
770	Stone City Machine & Tool Co., Bedford, Ind.
771	Penta Laboratories, Inc., Santa Barbara, Calif.
772	*Muntz TV, Inc., Chicago 13, Ill.

Code No.	Company
773	*The Forest Electric Company, Forest Park, Ill.
776	*Ogden Coil & Transformer Co., Chicago 12, Ill.
780	DeJur-Amsco Corporation, Long Island City, N. Y.
781	Vacuum Tube Products Co., Inc., Oceanside, Calif.
782	Spencer Kennedy Laboratories, Inc., Boston 35, Mass.
783	Eldico Electronics, Sub. Dynamics Corp. of America, Mineola, L. I., N. Y.
784	Johnson Electronics Inc., Orlando, Fla.
785	*Worthco Corporation, Beverly Hills, Calif.
786	*Hinners-Galanek Radio Corp., Cavalier Radio & Television Div., Long Island City 6, N. Y.
787	*Sonotone Corporation, Elmsford, N. Y.
789	McGregor Electronic Industries, Inc., McGregor, Ia.
791	*Hopkins Engineering Company, San Fernando, Calif.
792	Atlantic Wire & Cable Corp., College Point 56, N. Y.
793	McIntosh Laboratory, Inc., Binghamton, N. Y.
794	Harman-Kardon, Inc., Westbury, Long Island, N. Y.
797	Vidaire Electronics Mfg. Co., Lynbrook, L. I.
798	*Supreme Transformer Corporation, Chicago 39, Ill.
799	*California Magnetic Control Corp., North Hollywood, Calif.
802	Tempo T. V. Mfg. Corp., Canoga Park, Calif.
803	Microwave Associates, Inc., Boston 15, Mass.
804	*Union Electric & Manufacturing Company, Jersey City 7, N. J.
806	*Gordos Corporation, Bloomfield, N. J.
808	*Henald Manufacturing Co. Inc., Piper City, Ill.
809	Varian Associates, Palo Alto, Calif.
810	Translite Electronics Corp., Chicago 39, Ill.
811	Continental Electronics Corp., Philadelphia 31, Penna.
812	*Bradley Laboratories, Inc., New Haven 11, Conn.
813	Adler Electronics Inc., New Rochelle, N. Y.
815	San Fernando Electric Mfg. Co., San Fernando, Calif.
816	Dale Products, Inc., Columbus, Nebr.
817	Brubaker Electronics, Inc., Culver City, Calif.
818	*Tel-O-Tube Corporation of America, East Paterson, N. J.
819	Z & W Mfg. Corp., Wickliffe, Ohio
820	*United Electronic Manufacturing Corp., Union City, N. J.
822	*Syntronic Instruments, Inc., Addison, Ill.
824	*Videocraft Manufacturing Co., Chicago 39, Ill.
825	*Thermador Electrical Mfg. Co., Los Angeles 22, Calif.
828	Midland Manufacturing Co., Inc., Kansas City 15, Kan.
830	*Triad Transformer Corporation, Venice, Calif.
831	*Better Coil & Transformer Corp., Goodland, Ind.
832	McCoy Electronics Co., Mt. Holly Springs, Penna.
834	*Mel-Rain Corporation, Indianapolis 4, Ind.
835	*Ratel, Inc., Goleta, Calif.
836	*National Video Corporation, Chicago 32, Ill.
837	*Carol Electronics Corporation, Martinsburg, W. Va.
840	Orradio Industries, Inc., Opelika, Ala.
841	Central Electronic Manufacturers, Inc., Denville, N. J.
842	The Tetrad Company, Yonkers 2, N. Y.
844	Rectifier Corporation, Fajardo, Puerto Rico
845	International Rectifier Corporation, El Segundo, Calif.
847	University Loudspeakers, Inc., White Plains, N. Y.
848	Onondaga Pottery Company, Electronics Division, Syracuse 1, N. Y.
850	Chromatic Television Laboratories, Inc., New York 36, N. Y.
851	R. L. Drake Company, Miamisburg, Ohio
852	Andrews Tower, Inc., Fort Worth 11, Tex.
855	International Instruments Inc., New Haven 15, Conn.
856	Clevite Transistor Products, Division of Clevite Corporation, Waltham 54, Mass.
857	*V-M Corporation, Benton Harbor, Mich.
861	Goodline Corporation, Alhambra, Calif.
862	Cal-Tronics Corporation, Los Angeles 45, Calif.
863	*James Vibrapowr Company, Chicago 18, Ill.
864	*Tele-Ray Tube Co., Inc., Yonkers, N. Y.
865	Davis Electronics Co., Burbank, Calif.
866	*Industrial Hardware Manufacturing Co., Inc., New York 12, N. Y.
867	C-B-C Electronics Co., Inc., Philadelphia 33, Pa.
868	Telechrome Incorporated, Amityville, N. Y.
869	*Kline Iron and Steel Company, Columbia, S. C.
870	Cubic Corporation, San Diego 11, Calif.
871	Precision Electronics Inc., Franklin Park, Ill.
872	S & A Electronics, Toledo 5, Ohio
878	Acro Products Company, Philadelphia 28, Penna.
879	Litton Industries, Inc., Beverly Hills, Calif.
881	*Unitek Corporation, Pasadena 8, Calif.
882	Plamondon Magnetics Company, Chicago 22, Ill.
884	*C R T Electronics Corp., Mt. Vernon, N. Y.
885	Miniature Electronics Components, Nashville 4, Tenn.
886	Calvideo Tube Corporation, Los Angeles 45, Calif.
887	International Telemeter Corporation, Los Angeles 25, Calif.
888	Connector Corporation, Chicago 30, Ill.
890	Wire Company of America, Santa Barbara, Calif.

Code No.	Company
891	Southern Electronics Company, Greeneville, Tenn.
892	*American Transformer Corp., Chicago 7, Ill.
893	Armel Electronics Inc., Brooklyn 32, N. Y.
894	Hy-Gain Antenna Products Company, Lincoln 4, Nebr.
895	*Dinion Coil Co., Inc., Caledonia, N. Y.
896	Viking Industries, Inc., Canoga Park, Calif.
897	Tresco, Inc., Philadelphia 28, Penna.
898	Convair, Pomona Division, General Dynamics Corp., Pomona, Calif.
900	ACF Electronics, Division of ACF Industries, Inc., Alexandria, Va.
901	*Cargo Packers, Inc., Glendale 27, N. Y.
902	Elgin Metalformers Corporation, Elgin, Ill.
903	D & M Products, Detroit 35, Mich.
904	Pan-Electronics Corporation, Griffin, Ga.
906	*Coilcraft, Incorporated, Cary, Ill.
905	Allied Research & Engineering Div., Allied Record Manufacturing Co., Hollywood 38, Calif.
908	*Aerocoil, Inc., Jersey City, N. J.
909	*Chester Cable Corp., Chester, N. Y.
910	*Aerolite Electronics Corp., Union City, N. J.
911	International Electronic Industries, Inc., Nashville 1, Tenn.
912	*Blackburn Electronic Corporation, Wyoming, Pa.
913	General Products Corporation, Union Springs, N. Y.
915	Inductor Engineering, Inc., Lewes, Del.
916	Texas Electronics Mfg. Co., Houston, Tex.
917	Resitron Laboratories, Inc., Los Angeles 25, Calif.
918	*Oaktron Industries Inc., Monroe, Wis.
919	Richardson Company, Hollywood 28, Calif.
920	The Antenna Specialists Co., Cleveland 6, Ohio
921	Technical Training Institute, Portland 11, Ore.
922	Standard Television Tube Corp., New Orleans 12, La.
923	Jerrold Electronics Corporation, Philadelphia 3, Pa.
924	Radio Development & Research Corp., Paterson 3, N. J.
925	Kay Lab, San Diego 11, Calif.
926	*Todd Electric Company, Inc., Yonkers, N. Y.
927	General Mills, Inc., Mechanical Division, Minneapolis 13, Minn.
928	*Acme Coil & Transformer Corp., Chicago 14, Ill.
929	Parker Metal Goods Company, Worcester, Mass.
931	Skiatron Electronics & Television Corp., New York 14, N. Y.
933	*Magnetic Coil Manufacturing Company, Chicago 22, Ill.
934	*Oaktron Electric Company, Tinley Park, Ill.
935	*Electrons, Incorporated, Newark 3, N. J.
936	*Hamilton-Hall Mfg. Company, Milwaukee 2, Wis.
938	Farnsworth Electronics Company, Fort Wayne, Ind.
940	Bomac Laboratories, Inc., Beverly, Mass.
941	Electronic Engineering Company of California, Los Angeles 57, Calif.
942	Federated Metals Division, American Smelting and Refining Co., New York 5, N. Y.
943	G. M. Giannini & Co., Inc., Pasadena 1, Calif.
944	Insulated Circuits, Inc., West Caldwell, N. J.
945	*The J & G Machine Co., Inc., Worcester 4, Mass.
946	Mechanical Steel Tubing Corp., Bronx 59, N. Y.
947	Pacific Semiconductors, Inc., Culver City, Calif.
948	The Radix Wire Company, Euclid 32, Ohio
949	*Apex Coil and Transformer Corporation, Chicago 8, Ill.
951	Kost Products Company, Inc., Chicago 39, Ill.
952	Rhein Sound Systems, Inc., Marion, Ill.
953	Scientific Radio Products, Inc., Omaha 8, Nebr.
954	Union City Filament Corp., Union City, N. J.
956	Vitramon, Inc., Bridgeport 1, Conn.
957	Winston Electronics, Inc., Philadelphia 27, Pa.
958	Five Star Manufacturing Company, Houston 20, Tex.
959	*Transitron Electronic Corporation, Melrose, Mass.
960	*Ontario Industries, Inc., Hornell, N. Y.
961	Anton Electronics Laboratories, Inc., Sub. U. S. Hoffman Machinery Corp., Brooklyn 37, N. Y.
962	*Televideo Corporation of America, Los Angeles 18, Calif.
963	Foto-Video Laboratories, Inc., Bloomfield, N. J.
964	Huggins Laboratories, Inc., Menlo Park, Calif.
965	Moloney Electric Company, St. Louis 20, Mo.
966	Mullenbach Division of Electric Machinery Mfg. Co., Los Angeles 58, Calif.
967	North American Aviation, Inc., Downey, Calif.
968	Rapid Die and Molding Co., Schiller Park, Ill.
970	TelAutograph Corporation, Los Angeles 45, Calif.
971	Vector Electronic Company, Los Angeles 65, Calif.
972	*Industrial Tubes, Inc., Geneva, Ill.
973	*PCA Electronics Inc., Sepulveda, Calif.
974	*Lectrohm, Inc., Chicago 30, Ill.
975	*Sherold Crystals Inc., Kansas City 8, Mo.
976	*Model Engineering & Manufacturing, Inc., Chicago 18, Ill.
977	*Filtors, Inc., Port Washington, L. I., N. Y.
978	American Electronics Company, New York 59, N. Y.
979	Ratigan Electronics Inc., Los Angeles 11, Calif.
980	Texas Instruments Incorporated, Dallas 9, Tex.
982	*Precision Coil Manufacturing Company, Santa Monica, Calif.
983	*Gonset Division, L. A. Young Spring & Wire Corp., Burbank, Calif.
984	*Electro-Winders Co. Inc., Covina, Calif.
985	*Bartlett Manufacturing Company, Glenview, Ill.
986	*Delevan Electronics Corporation, East Aurora, N. Y.
987	*Florida-Merit Inc., Hollywood, Fla.
988	Tansitor Electronics, Inc., Bennington, Vt.
989	*Marvel Electric Corporation, Chicago 22, Ill.
990	General Transistor Corporation, Richmond Hill 18, N. Y.
991	Benson-Lehner Corporation, Los Angeles 64, Calif.
992	Grayhill, La Grange, Ill.
993	Midwest Speaker Company, McGregor, Iowa
994	Eberline Instrument Division, Reynolds Electrical and Engineering Co., Santa Fe, New Mexico
995	Standard Crystal Company, Kansas City 8, Mo.
996	*Grand Ra-Tronics, Inc., Sub. of Grand Transformers, Inc., Grand Haven, Mich.
997	United States Dynamics Corporation, Boston 20, Mass.
999	*National Tel-Tronics Corp., Yonkers, N. Y.
1000	Switchcraft, Inc., Chicago 22, Ill.
1001	*Comar Electric Company, Chicago 18, Ill.
1002	*The Amplifone Corporation, Chicago 40, Ill.
1003	*Fugle-Miller Laboratories, Clark, N. J.
1004	*J. E. T. Electronics Company, Glendale 4, Calif.
1005	*Quality Transformer & Coil Co., Inc., Chicago 14, Ill.
1006	*Fischer Electric Co., Inc., Chicago 14, Ill.
1007	Hycon Electronics, Inc., Pasadena, Calif.
1008	Robertshaw-Fulton Controls Company, Aeronautical Division, Anaheim, Calif.
1009	Weber Aircraft Corporation, Burbank, Calif.
1010	*Milwaukee Transformer Company, Milwaukee 9, Wis.
1011	*Park Products Company, Cleveland 3, Ohio
1012	Red Bank Division, Bendix Aviation Corp., Long Branch, N. J.
1013	*Ion Capacitor Corp., Columbia City, Ind.
1014	*Burnell & Co., Inc., Yonkers, N. Y.
1015	*Electralab Incorporated, Needham Heights 94, Mass.
1016	*Kemtron Electron Products, Inc., Newburyport, Mass.
1017	*Campbell Industries, Inc., Chattanooga 9, Tenn.
1018	*Bradford Circuits, Evanston, Ill.
1019	*Communication Accessories Company, Hickman Mills, Mo.
1020	Hancock Electronics Corporation, Redwood City, Calif.
1021	*Micropulse Engineering, Burbank, Calif.
1022	*International Electronics Corp., New York 12, N. Y.
1023	International Electronic Research Corp., Burbank, Calif.
1024	Leach Corporation, Los Angeles 3, Calif.
1025	*Torwico Electronics, Inc., Union, N. J.
1026	Soundolier, Inc., St. Louis 22, Mo.
1027	Presto Recording Company, Paramus, N. J.
1028	*Gray & Kuhn, Inc., Roslyn Heights, N. Y.
1029	*Keiser's Industries, Inc., Mt. Holly Springs, Pa.
1030	*NYT Electronics, Inc., Burbank, Calif.
1031	A.L.A. Industries, Inc., Harrison, N. Y.

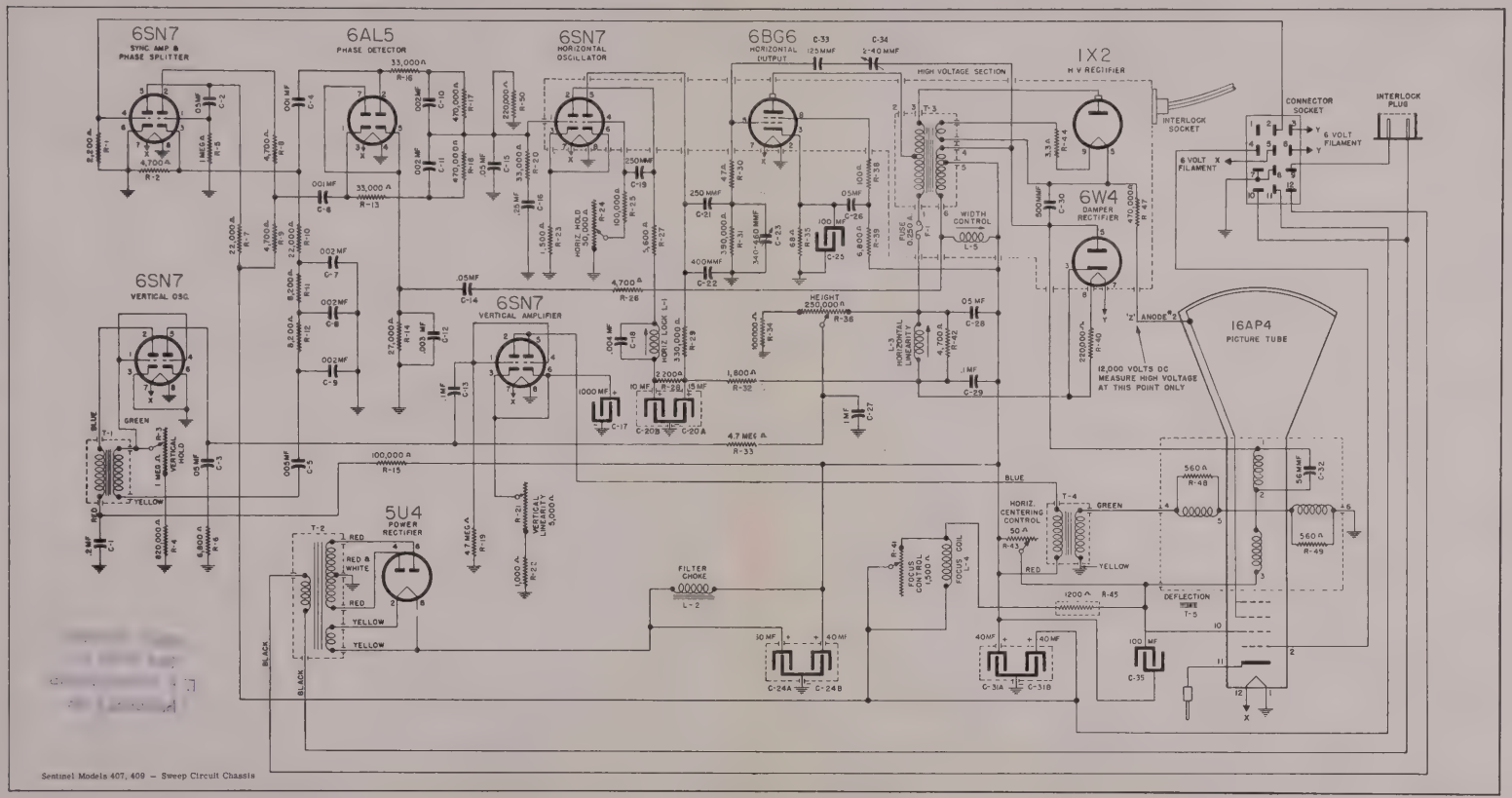

NOTE: SOME MODELS USE A TUNER UNIT WITH A 6BH6 TUBE CONNECTED AS SHOWN
NOTE TUNER UNITS WITH A 6AG5 TUBE ARE CONNECTED TO POINTS INDICATED BY ROMAN NUMERALS
6BH6 RF AMPLIFIER
6AG5 MODULATOR
6C4 OSCILLATOR
6AG5 RF AMPLIFIER
6AG5 1st I F AMPLIFIER
6AG5 2nd I F AMPLIFIER
6AG5 3rd I F AMPLIFIER
6AL5 VIDEO DETECTOR
6AH6 VIDEO AMPLIFIER
6AU6 SYNC SEPARATOR
6AU6 SOUND I F AMPLIFIER
6AL5 SOUND DETECTOR
6SQ7 AUDIO AMPLIFIER
6AS5 AUDIO OUTPUT
CHANNEL
R F CHOKE
SELENIUM RECTIFIER
POWER TRANSFORMER T-8
P M SPEAKER
TO 5U4 RECT HEATER HIGH VOLTAGE BETWEEN PINS 3 AND 8 AND CHASSIS
I HEATER

Sentinel Models 407, 409 — RF-IF Chassis

The PHOTOFACT Servicer

Vol. 31 Nos. 309 & 310 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ February 1, 1956

The service information in this Servicer provides data on models which we have been unable to present in PHOTOFACT Folders. The receivers are not in current production; a requirement for PHOTOFACT coverage, and we are therefore presenting schematics and supplementary data that will be of assistance when servicing these models.



Sentinel Models 407, 409 — Sweep Circuit Chassis

The PHOTOFACT Servicer

September 15, 1950 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ Vol. 11, Nos. 107 & 108

"It is easy to meet expenses - - - they are all around." - Anon.

FIELD EXPERIENCES -

For every "Field Experience" published, we issue a certificate good for one PHOTOFACT Folder Set. Awards are issued at the time of publication. Since it is impossible to verify the accuracy of contributions, we cannot be responsible for either the diagnosis made of the receiver trouble, or the results which will be obtained by following the suggested repair routine. All contributions become the property of Howard W. Sams & Co., Inc.

OLDSMOBILE Model 982420
Photofact Set No. 57, Folder No. 12

Complaint: No volume.

Cause: The shielded cable from detector grid to volume control center tap, and from volume control to .01 capacitor to output secondary IF blue lead, has high resistance short between leads cutting volume of set to almost half.

Remedy: Replaced this cable with two individual shielded leads and trouble was corrected.

Pete and Lee's
Radio & Electric Service
Wall Lake, Iowa

* * *

REPAIRING BROKEN FLEXIBLE SCREW PIGTAILS

The slugs of receivers which have broken flexible screw pigtails can be repaired easily by placing a 1/16" hollow rivet on the end and using as a ferrule. If the wire pigtail is lost guitar string is a convenient substitute. Either the D or the A string can be used.

Harris Radio Service
Blaine, Ohio

* * *

GENERAL ELECTRIC Model 16T1

Complaint: Raster, but no picture and no sound.

Cause: Through signal injection, it was found that the audio amplifier and also the IF amplifier operated normally, but not the tuner or the video amplifier. Plate voltage on the 12AT7 was normal but cathode voltage was very low (indicating low emission). Following heater measurement on this last tube revealed only 3-1/2 volts.

Remedy: Replacement of the shorted disc by-pass (green 5000 MMF.) on pin 3 of the preceding 6AU6 restored the heater voltage to its value, and evidently the tuner, with its filaments in series with the video amplifier, returned to normal operation. This same trouble involving a heater by-pass in the head-end unit was later found in a GE model 12T7, where the kinescope would light up and then go out, the heater being by-passed through a shorted condenser at the base of the 6BC5 (2nd RF amplifier). In this case, it was easier to replace the front-end, the bad condenser being underneath the channel selector.

Boller's Television and Radio Service
311 West Main Street
Springfield, Ohio

* * *

EMERSON Model 611
Photofact Set No. 76, Folder No. 11

Complaint: Intermittent video, poor vertical sync, or no video.

Cause: Resistors R41, R47, R38 (all or some) may appear overheated.

Remedy: Replace resistors and video coupling capacitor C-48, which becomes leaky. Use 600

(Field Experiences continued on Pages 5 and 6)

DONALD G. FINK, EDITOR OF ELECTRONICS MAGAZINE, has given us permission to reprint the following article: "WHY TELEVISION RECEIVERS FAIL IN SERVICE." We know you will find it extremely interesting and, we hope, helpful.

Why Television Receivers

WITH TODAY'S SPOTLIGHT on television receiver production figures and dollar volume of sales, there is a tendency to overlook the fact that television servicing is also big business. Based on current average prices for sets and yearly service contracts, every dollar paid for a television receiver will within five years be matched by another dollar paid to service organizations. Putting it another way, an estimated $325 million will be paid out in 1950 just to keep television sets running, in contrast with only $300 million of business (at factory prices) done by the entire electronic industry in 1939.

Why does it cost so much to keep tv sets running? To probe into this question, sampling surveys were made of the field experiences of tv manufacturers who have their own service organizations. In addition, independent service organizations who take on service contracts for all makes of sets were queried. This article presents in detail the results of an investigation by the staff of ELECTRONICS.

Breakdown of Calls

Reasons for calling a television serviceman are broken down in Table I for four representative organizations. A quick check shows that only about 30 percent of these reasons are traceable to human nature, to antenna systems and to other nonmanufacturing factors. The remaining 70 percent of the calls deserve detailed technical analysis here because they can be eliminated at least in part at the manufacturing level, with immediate savings in service division overhead and long-term gain in serviceman and consumer goodwill.

Just as in radio sets, a defective tube is by far the most common cause of trouble in a television receiver. In television, however, causes of tube failures are much more often attributable to set design engineers than to tube manufacturers. Tubes are worked close to the upper limits of their ratings in many tv circuits, leaving little margin for normal tolerances of other parts and for effects of ageing. As a result, tube testers are rarely if ever used for checking tubes in tv sets. Substitution of new tubes is the universal practice among service organizations. So critical is circuit design in some cases that it is not unusual to have to try half a dozen new tubes before finding one that works in a particular set.

Picture tube replacement ranks high, considering that it is the most expensive replacement part in a tv set. On a first-year service contract, about half the picture tube failures occur within the first three months, covered in all cases by the standard 90-day warranty of the manufacturer. The trend is toward free replacement by manufacturers during the remainder of the first year as well, usually under a first-year contract whereby the set manufacturer replaces all defective parts for a blanket price of $5 to $20 that is paid by the service organization or dealer.

Reasons for replacement of biggest troublemakers among other tubes are given in Table II. In general, the practice of tv servicemen is to replace a tube if that will make the set work again, even though some other part is the real cause of trouble. Replacement with a selected upper-limit new tube can cure a lot of other troubles in certain circuits, eliminating removal of the chassis to the shop for more expensive replacement of a cheaper under-chassis component.

Other Troubles

Antenna troubles vary greatly from one locality to another, and depend also on the number, location and effective signal strengths of the

Table I—Analysis of Television Receiver Service Calls

Reason for Call	Percent of Total Calls			
	Mfr. Service Organization No. 1	Mfr. Service Organization No. 2	Independent Service Co. No. 1	Independent Service Co. No. 2
Replace picture tube	10%	4%	5%	6%
Replace other tubes	30	21	35	25
Reorient antenna*	8	2	15	10
Repair antenna system*	3	6	2	2
Change antenna or add high-band*	1	2	1	3
Readjust back-of-set controls	2	1	13	12
Correct deficiency in circuit design	1	7	6	2
False calls*	4	15	10	10
Replace paper capacitor	9	1	3	2
Replace resistor	9	1	3	3
Repair or replace tuner	8	15	2	5
Replace other components	4	15	1	6
Repair poorly soldered joint	5	4	1	1
Realign	4	2	1	8
Customer not at home*	2	4	2	5
* Total not fault of set manufacturer	18%	29%	30%	30%

Fail in Service

Three years of field experience by manufacturers and independent service companies reveals 15 major reasons for service calls. Many can be eliminated at design and production stages, often with accompanying savings in manufacturing cost

transmitters in the area. As localities reach their legal quota of stations, antenna calls diminish since the required compromise orientation can be made at the time of installation. New antenna types are proving highly satisfactory in the field and reducing antenna calls.

On the other hand, as more sets enter second and third years of service, antenna repair calls go up. Though the figures in Table I are for the entire three-year period since the war, 1949 sales of well over 2,000,000 tv sets pretty well weight the picture.

Readjustment of back-of-set controls is high in percentage for independents, low for manufacturer service organizations. Stability of circuits used by the particular manufacturers polled may be one reason. Another fact, more pertinent to independents who must know a little about a lot of different sets, is the psychological value of actually doing something to a set even when the picture is found to be of acceptable commercial quality for the particular set involved.

Corrections of circuit design come in batches coinciding with launching of new tv models. Least trouble comes from models using refinements or improvements of the previous year's circuitry, and most trouble when designers choose to toss out the experience of former years and start from scratch.

Where a capacitor goes, so often goes a resistor, hence figures for these two parts run hand in hand across the board. Importance of incoming inspection of components and quality control during assembly shows up in the total of 18 percent for resistor and capacitor replacements by one manufacturer as contrasted to a 2-percent total for the other.

Tuner troubles, particularly tuning switches, rank high with manufacturers, possibly because independents touch these critical units only as a desperate last resort. Men specializing in one make of set and having replacement tuners for them right on the service truck can make a changeover of a complete tuner quickly and at fairly low cost. Independent servicemen obviously cannot carry spare tuners for all sets, nor can they be expected to take apart double and triple-shielded tuners in the home for repairs. Fortunately, prevalence of tuner trouble is going down with improved design in 1949 and 1950 models of most sets.

Electrolytic capacitor troubles run as high as 3 percent for one independent who handles a lot of off-brand and lower-priced sets and also has a large number of second and third-year contracts on the books. The other three sources rated electrolytics as under one percent, however. Flyback transformers receive vitriolic comment in most shops, but troubles with these parts just about vanish when manufacturers change over to ceramic-core units.

An independent serviceman just cannot understand how a joint could

Table II—Tubes Failing Most Often in Television Receivers

Type and Function	Nature of Failure	Remedy
6BG6G and 19BG6G horizontal output	Gassy, resulting in dead tube, due to electrolysis at top connection	Change to new tube, which in some makes now have a leaded glass envelope
	Can't fill screen because near lower limit of sensitivity	Select new tube near upper limit of sensitivity
	Barkhausen interference, producing black line at edge of picture	Try new tube or put magnet around tube
6SN7 sync	Open filament, low gain, intermittent or gassy	Try new tube. If in relaxation oscillator, selection is needed
5U4 and other rectifiers	Open filament, or loss of emission	Install new tube; drive less hard if possible, as these tubes are often operated too close to rated limits
6J6 oscillator	Microphonic	Select nonmicrophonic new tube
12AT7 converter	Failure to oscillate on high channels because of low g_m	Select new tube that will oscillate
5V4 and other damping tubes	Flashover, causing burnout, apparently because of heater sagging	Replace tube
12AU7 video amplifier	Microphonic	Select nonmicrophonic new tube

DUMONT TV Model RA-103
Photofact Set No. 90, Folder No. 3

Cause: Filter resistor, part No. 2-1761, 1280 ohms, 24.1 watts, shorts to chassis and arcs, burning nearby capacitor C99 (.1 MFD. @ 600 volts), off of focus control.

Remedy: Replace both resistor and capacitor. Also install 1/4 amp. fuse between pin 8 on 5V4 damper tube and horizontal linearity coil. This fuse was not included during manufacture. Three sets in succession had the same trouble.

Note: Insulate new resistor from chassis with thin sheet of fiber.

Jackson's Radio Service
229 Riverview Avenue
Newton Falls, Ohio

* * *

CHEVROLET Model 986146
Photofact Set No. 28, Folder No. 6

Complaint: Heater lead to the 7Q7 had shorted to power supply cover. This lead has been drawn tight around the sharp corner of cover and vibration after some use has worn insulation.

Remedy: Reroute wire and insulate.

PHILCO Model 46-480
Photofact Set No. 19, Folder No. 25

Complaint: The 100K resistor, (Item 50) connected to pin No. 5 of 7F8 tube may cause difficult service diagnosis if it changes value.

Cause: A decreased value of this resistor will cause low conversion gain with background hiss on stations at low frequency end of dial. Voltage check will show slight increase to cathode of 7F8.

Remedy: A short length of insulated wire will assist in making voltage check on 7F8.

Editor's Note: Both above Experiences were submitted by:

Benson Radio
Jasper, Minn.

* * *

ADMIRAL Chassis 30A1
Photofact Set No. 57, Folder No. 2

Complaint: Intermittent. No control over brightness.

Cause: Resistor R-99 in the focus control circuit defective.

Remedy: Replace with 1200 ohm, 10 watt resistor.

ADMIRAL Chassis 30A1
Photofact Set No. 57, Folder No. 2

Complaint: Partial fold-over at bottom of picture.

Cause and Remedy: Check capacitor C-59 and C-60. Replace with good capacitors. Also check R-114 in same circuit, which should be 2.2 meg.

ADMIRAL Chassis 30A1
Photofact Set No. 57, Folder No. 2

Complaint: Fold-over on left-hand side of picture.

Cause and Remedy: Check for leakage on C-79 and C-78. Replace with good capacitors.

Editor's Note: All three above Experiences contributed by:

Horace D. Westbrooks
117 W. Solomon Street
Girffin, Georgia

* * *

TRAV-LER Model A16GT
Photofact Set No. 86, Folder No. 11

Complaint: Negative picture. Also black vertical bar in middle of picture. Contrast and fine tuning controls inoperative.

Cause: R-48 6800 ohm, 5 watt resistor has changed value. On some of these receivers I have found it changed as much as 30K ohms.

Remedy: Replace with a good 6800 or 7K ohm 10 watt resistor, wire wound.

P. E. McGee
Moreland Avenue Radio and
Television Service
926 Moreland Avenue, S. E.,
Atlanta, Georgia

volt unit instead of 400, as originally used.

John W. Massecar
Telectron Radio and Television
9312 South Western
Los Angeles, California

* * *

STEWART WARNER Model A72T3
Photofact Set No. 32, Folder No. 24

Complaint: Distortion, no fm reception, and generally poor service.

Cause: Replacement of audio coupling capacitor No. 14 and the rectifier, cured the distortion. Visual alignment check showed low "Q" of coils, which was probably due to absorption of moisture, as owner uses gas heat.

Remedy: Remove shields from IF coils and bake all coils with heat lamp, then coat coils with insulating varnish or coil dope and realign. An AC line antenna was also installed for the FM section.

This set has been returned to me twice since for tube replacements and is giving good service, according to the owner.

MINERVA Model W710
Photofact Set No. 5, Folder No. 25

Complaint: Often burns out 35Z5GT tube.

Cause: Owner has children who sometimes turn set off, then right back on. The damage is probably caused by the high initial current to the filter capacitor when set is turned on.

Remedy. Install 47 ohm 1/2 watt surge resistor in plate circuit of 35Z5GT, from prong 3 to prong 5, and 100 ohm 1/2 watt from prong 2 to prong 3. Dial lamp was also changed to type 44.

FORD Model 7070
Photofact Set No. 45, Folder No. 10

Complaint: Static-like noise and volume goes up and down.

Cause: Lead on antenna coil (Item No. 54) shorting to powdered iron core which encloses coil.

Remedy: Disassemble the coil, bend lead in to coil form and cement the insulating sleeve in place to hold leads down.

Editor's Note: All three above Experiences were contributed by:

Joe B. Higginbotham, Jr.
Route 1, Box 67
Dewey Rose, Georgia

* * *

PONTIAC Model 984570
Photofact Set No. 95, Folder No. 4

Complaint: We have had three of these with dead oscillator coil L2-C.

Remedy: Resoldering the connections at the coil lug repaired two of them. The third had an internal open, and the complete coil assembly was replaced.

RCA Model 8X71-72
Photofact Set No. 63, Folder No. 15

Complaint: Two of these sets came through new that would receive nothing but CW on the FM band.

Remedy: Both were cleared up by adjusting A-8 and A-13 of L7, with no further alignment. A quick check of this alignment can be made by voltage readings at pins 1 and 5 of V4. Ours read 0 and -15 volts instead of the normal 1 and -.3 respectively.

Editor's Note: Both above Experiences were contributed by:

B. D. McKay
H & M Radio Co., Inc.
Pageland, South Carolina

* * *

MOPAR Model 803
Photofact Set No. 66, Folder No. 12

Complaint: Dial moves off scale. Also faulty calibration.

Remedy: Drill a 1/64" hole through the tuning control shaft and insert wooden peg to hold the cord in place. Six turns of cord around the shaft are sufficient to allow full scale movement of the pointer.

Francis A. Rossman, Service Mgr.,
Phono-Electronic Company
499 Bellefonte Avenue
Lock Haven, Pennsylvania

get out of a factory without being soldered, hence doesn't look for bad joints as a rule. Manufacturer servicemen, on the other hand, are given guided tours through the factory so they can see how easy it is to miss a joint or two, and are specially drilled in hunting for bare joints hence find more of them in the field. Independents may offset an unsoldered high-resistance joint by replacing a tube or adjusting the screwdriver controls to compensate.

Realignment includes shifting the i-f value when two receivers in the same building interfere with each other. Most alignment work is done in the shop.

No matter how definitely an appointment is made for a service call, women still persist in "just stepping next door" at the appointed time, or even forget about it and go off for the day. False calls are high, but there isn't much that can be done about them until servicing is put on a charge-per-call basis. Temporary interference, transmitter troubles, and misrepresentation by salesmen as to merits of built-in antennas are just a few of the reasons for dry runs. In addition, there are times when work must be done to retain goodwill or prevent badwill even though the service organization has no responsibility.

Home vs Shop Repairs

The percentage of sets fixed in homes ranges from 20 percent to 96 percent, depending on the service organization. Top figure is logically that of a manufacturer's service organization, where men receive specialized training and acquire experience on just the one make of set and carry practically all needed repair parts and test equipment for that make right with them in the service truck. For high-caliber independent service organizations handling all makes of sets, an average of 70 percent of calls completed in homes is considered excellent because they cannot possibly carry spare parts for all makes.

Low figure of 20 percent is for independent service organizations that employ low-salary field men who know little more than how to replace tubes and remove the chassis. These firms rely heavily on at-the-shop experts despite obvious costliness of making two comes and goes per service call. Such practices have resulted in bankruptcies of some service organizations, with consequent headaches and loss of good-will for manufacturers of sets left stranded without service.

With an average of 5 to 6 service calls per set per year for all types of organizations and an installation cost running as high as $20 per set, almost any kind of bookkeeping quickly reveals the difficulties of breaking even on service contracts when a high percentage of sets have to be brought into the shop. Firms doing this can of course exist handsomely as long as new service contract money flows in at an accelerating rate, but eventually comes the day of reckoning. As a result of bitter experience along these lines, more and more manufacturers are exhibiting interest in the service organizations to whom their dealers farm out service contracts.

Design Economies

Another topic probed during this survey was the current accent on cost-cutting in tv receiver production. Some of the items and techniques being used or receiving consideration are listed
with advantages and drawbacks of each. Service organizations contributed equally as much as manufacturers to this tabulation, showing their intense interest in the effects of manufacturing economies on service calls.

Many of the items listed
can give lower manufacturing costs than comparable earlier versions. Most of the changes have little or no effect on the number of service calls or the quality of set performance. A few of the changes actually improve performance and reliability, while still others have adverse effects on performance that in the long run can offset cost savings.

Although attention to individual items one after another can result in appreciable savings, much broader thinking is needed to get maximum benefits. One philosophy of television receiver design has the design engineer starting not with components or even circuits, but with pure logic. The overall receiver is designed first to do a certain commercial and technical job, using a number of separate system components corresponding to the blocks of a block diagram. Possible patterns of interconnection of the blocks are studied, with no concern for details of internal circuitry. Deliberations might follow a line like this:

"From an overall point of view a receiver should have a flat avc with gain to spare. Perhaps, therefore, the avc might stabilize the signal at the final output on the picture tube grid. In so doing it might be arranged to hold the black level to a constant bias. This would not only prevent variation of background but would also make it much easier to pick off sync at that point since the sync would be held by the powerful avc to a constant bias. A single stage of video, d-c coupled, is appropriate in this case. Instead of the usual complicated video contrast control circuit with its long hot leads, the gain control can now be a simple d-c control, arranged to add a variable bias in series with the video signal. The avc counteracts this to force the black level to remain at its proper bias, and in so doing changes the contrast."

Reasoning in this way, the design engineer carefully investigates the consequences of all sorts of interconnections, looking particularly for arrangements that make efficient use of tubes and circuits. Thus, by careful critical thinking he makes sure that the overall economy of the system is excellent and the performance is the best possible for the intended purpose and price range. Last rather than first comes attention to components and production practices.

Broad overall reasoning during design stages is difficult and requires great familiarity with television circuitry and all its possible variations. Above all, such designing requires clear thinking without being distracted by the many details involved. Recent experience shows, however, that it is the best approach to the problem of obtaining improved television receiver performance at lower initial cost, with less complexity, and lower service cost.—J.M.

The PHOTOFACT Servicer

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RETMA PRODUCTION SOURCE CODE — January, 1956

Code symbols assigned to radio-television manufacturers and suppliers, arranged both alphabetically by companies and numerically by code numbers.

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ALPHABETICAL LIST

RETMA Production Source Code Symbols

January 1, 1956

(* Indicates non-members)

Company	Code No.
ACF Electronics, Division of ACF Industries, Inc., Alexandria, Va.	900
*Acme Coil & Transformer Corp., Chicago 14, Ill.	928
*Acme Electric Corporation, Cuba, N. Y.	413
Acro Products Company, Philadelphia 28, Penna.	878
Adler Electronics, Inc., New Rochelle, N. Y.	813
*Admiral Corporation, Chicago 47, Ill.	101
*Aerocoil, Inc., Jersey City, N. J.	908
*Aerolite Electronics Corp., Union City, N. J.	910
Aerovox Corporation, New Bedford, Mass.	102
*Aircraft-Marine Products, Inc., Harrisburg, Pa.	581
*Airdesign, Incorporated, Upper Darby, Pa.	476
*Ajax Condenser Co., Inc., Chicago 14, Ill.	705
*Aladdin Radio Industries, Inc., Nashville 2, Tenn.	689
Alcon Metal Products, Inc., Chicago 47, Ill.	573
Allen-Bradley Company, Milwaukee 4, Wis.	106
The Alliance Manufacturing Co., Inc., Alliance, Ohio	107
Allied Research & Engineering Div., Allied Record Manufacturing Co., Hollywood 38, Calif.	905
All Star Products, Inc., Defiance, Ohio	110
Alpha Metals, Inc., Jersey City 4, N. J.	733
Altec Lansing Corporation, Beverly Hills, Calif.	391
American Condenser Company, Chicago 40, Ill.	109
American Electronics Company, New York 59, N. Y.	978
*American Lava Corporation, Chattanooga 5, Tenn.	681
American Phenolic Corporation, Chicago 50, Ill.	554
*American Radio Hardware Co., Inc., Mt. Vernon, N. Y.	502
*American Radionic Co., Inc., Danbury, Conn.	648
*American Television, Inc., Chicago 40, Ill.	633
American Television & Radio Co., St. Paul 1, Minn.	551
*American Transformer Corp., Chicago 7, Ill.	892
Amperex Electronic Corporation, Hicksville, L. I.. N. Y.	111
*Amy, Aceves & King, Inc., New York 36, N. Y.	112
*Anaconda Wire & Cable Company, Hastings-On-Hudson 6, N. Y.	547
*Anchor Electronics Inc., Union City, N. J.	707
*Andrea Radio Corporation, Long Island City 1, N. Y.	113
Andrew Corporation, Chicago 19, Ill.	402
Andrew's Tower, Inc., Fort Worth 11, Tex.	852
The Antenna Specialists Company, Cleveland 6, Ohio	920
Anton Electronics Laboratories, Inc., Brooklyn 37, N. Y.	961
*Apex Coil & Transformer Corp., Chicago 8, Ill.	949
A. R. F. Products, Inc., River Forest, Ill.	115
Armel Electronics Inc., Brooklyn 32, N. Y.	893
The Arnold Engineering Company, Sub. of Allegheny Ludlum Steel Corp., Marengo, Ill.	116
Arvin Industries, Inc., Columbus, Ind.	248
Atlantic Wire & Cable Company, College Point 56, N. Y.	792
*The Astatic Corporation, Conneaut, Ohio	345
*Audio Electric Company, Chicago 26, Ill.	514
*Automatic Manufacturing Corp., Newark 4, N. J.	119
Automatic Radio Mfg. Co., Inc., Boston 15, Mass.	120
Avionex Electronics Corporation, Burbank, Calif.	860
Barker & Williamson, Inc., Upper Darby, Pa.	461
Barnes Metal Products Company, Chicago 23, Ill.	588
Basler Electric Company, Highland, Ill.	695
The Bead Chain Manufacturing Co., Bridgeport 5, Conn.	122
Belden Manufacturing Company, Chicago 44, Ill.	579
Bell Sound Systems, Inc., Columbus 7, Ohio	708
Bendix Radio, Division of Bendix Aviation Corp., Baltimore 4, Md.	125
Benson-Lehner Corporation, West Los Angeles 64, Calif.	991
*Best Manufacturing Co., Inc., Irvington 11, N. J.	371
*Better Coil & Transformer Corp., Goodland, Ind.	831
*Blackburn Electronic Corporation, Wyoming, Pa.	912
Bliley Electric Company, Erie, Pa.	128
David Bogen Co., Inc., New York 14, N. Y.	589
Bomac Laboratories Inc., Beverly, Mass.	940
*Bradley Laboratories, Inc., New Haven 11, Conn.	812
British Industries Corporation, Port Washington, L. I., N. Y.	409
Brubaker Electronics, Inc., Los Angeles 34, Calif.	817
Caledonia Electronics & Transformer Corp., Caledonia, N. Y.	503
*California Magnetic Control Corp., North Hollywood, Calif.	799
Cal-Tronics Corporation, Los Angeles 45, Calif.	862
Calvideo Tube Corporation, Los Angeles 45, Calif.	886
C. F. Cannon Co., Springwater, N. Y.	133
Cannon Electric Company, Los Angeles 31, Calif.	440
Capehart-Farnsworth Company, Fort Wayne 1, Ind.	177
*Carbonneau Industries, Inc., Grand Rapids 2, Mich.	719
Cargo Packers Inc., Brooklyn 18, N. Y.	901
*Carol Electronics Corporation, Martinsburg, W. Va.	837

Company	Code No.
*Carr Fastener Company, Division of United-Carr Fastener Corp., Cambridge 42, Mass.	370
*Carson Manufacturing Company, Indianapolis 18, Ind.	838
Carter Parts Company, Chicago 10, Ill.	610
C-B-C Electronics Co., Inc., Philadelphia 33, Pa.	867
CBS-Columbia, Division of Columbia Broadcasting System Inc., Long Island City 1, N. Y.	105
CBS-Hytron, Division of Columbia Broadcasting System Inc., Danvers, Mass.	210
Celco (Constantine Engineering Labs. Co.), Mahwah, N. J.	692
Centralab, Div. of Globe-Union Inc., Milwaukee 1, Wis.	134
*Central Coil Company, Inc., Indianapolis 22, Ind.	637
Central Sales & Manufacturing Co., Denville, N. J.	841
*Centran, Inc., Div. of Central Coil, Greensburg, Ind.	914
*Chester Cable Corp, Chester, N. Y.	909
Chicago Condenser Corporation, Chicago 47, Ill.	135
*Chicago Electronic Engineering Co., Chicago 47, Ill.	166
Chicago Standard Transformer Corp., Chicago 18, Ill.	
Chicago Division	138
Standard Division	306
Chicago Telephone Supply Corp., Elkhart, Ind.	137
Chromatic Television Laboratories, Inc., New York 36, N. Y.	850
Cinch Manufacturing Corporation, Chicago 24, Ill.	139
Clarostat Mfg. Co., Inc., Dover, N. H.	140
*Cleveland Electronics, Inc., Cleveland 3, Ohio	433
Clevite Transistor Products, Division of Clevite Corporation, Waltham 54, Mass.	856
*Clippard Instrument Laboratory, Inc., Cincinnati 31, Ohio	530
*Coilcraft, Incorporated, Cary, Ill.	906
*Coil Engineering & Mfg. Co., Inc., Roanoke, Ind.	141
Collins Radio Company, Cedar Rapids, Ia.	439
*Columbus Process Co., Inc., Columbus, Ind.	450
Communication Measurements Laboratory, Inc., Plainfield, N. J.	427
Condenser Manufacturers, Inc., Nashville 5, Tenn.	885
Connector Corporation, Chicago 30, Ill.	888
Conrac Incorporated, Glendora, Calif.	680
*Consolidated Radio Products Co., Chicago 10, Ill.	145
Consolidated Wire & Associated Companies, Chicago 16, Ill.	607
Continental Carbon Inc., Cleveland 11, Ohio	146
Continental Electronics Corp., Philadelphia 31, Penna.	811
CONVAIR, Division of General Dynamics Corp., Pomona, Calif.	898
*Co-Operative Industries, Inc., Chester, N. J.	760
Corning Glass Works, Corning, N. Y.	148
Cornish Wire Company, Inc., New York 7, N. Y.	149
Cosmic Radio Corporation, New York 59, N. Y.	704
*Crescent Industries, Inc., Chicago 31, Ill.	150
Croname, Incorporated, Chicago 13, Ill.	151
Crosley Radio and Television Division, Avco Manufacturing Corporation, Cincinnati 25, Ohio	152
*C.R.T. Electronics Corp., Mount Vernon, N. Y.	884
Crucible Steel Company of America, New York 17, N. Y.	525
Cubic Corporation, San Diego 6, Calif.	870
Dale Products, Inc., Columbus, Nebr.	816
J. W. Davis & Company, Dallas 9, Texas	563
*Davis Electric Company, Cape Girardeau, Mo.	628
Davis Electronics Co., Burbank, Calif.	865
*Dearborn Glass Company, Bedford Park, Ill.	385
DeJur-Amsco Corporation, Long Island City 1, N. Y.	780
Delco Radio Division, General Motors Corporation, Kokomo, Ind.	466
*Delevan Electronics Corporation, East Aurora, N. Y.	986
*Tobe Deutschmann Corporation, Norwood, Mass.	154
DeWald Radio Mfg. Corp., Long Island City 1, N. Y.	155
*Dinion Coil Co., Inc., Caledonia, N. Y.	895
D & M Products, Detroit 35, Mich.	903
*Dormitzer Electric & Mfg. Co., Inc., Cambridge 40, Mass.	493
R. L. Drake Company, Miamisburg, Ohio	851
Drake Manufacturing Company, Chicago 22, Ill.	586
Wilbur B. Driver Company, Newark 4, N. J.	156
DuKane Corporation, St. Charles, Ill.	252
*Dumont-Airplane & Marine Instruments, Inc., New York 5, N. Y.	157
Allen B. DuMont Laboratories, Inc., Clifton, N. J.	158
*DX Radio Products Company, Inc., Chicago 47, Ill.	159
Eberline Instrument Division, Reynolds Electrical and Engineering Co., Santa Fe, New Mexico	994
Hugh H. Eby, Inc., Philadelphia 44, Pa.	160
Eckstein Radio & Television Co., Minneapolis 6, Minn.	161
Eitel-McCullough, Inc., San Bruno, Calif.	162
*Elco Corporation, Philadelphia 40, Pa.	599
Eldico of New York, Inc., Mineola, Long Island, N. Y.	783
*Electrical Utilities Company, La Salle, Ill.	569
*Electrical Windings, Inc., Chicago 39, Ill.	682
The Electro Motive Mfg. Co., Inc., Willimantic, Conn.	164
*Electronic Circuits, Inc., Glenview, Ill.	985
*Electronic Components Corporation, Chicago 8, Ill.	515
Electronic Devices, Inc., Brooklyn 15, N. Y.	752
Electronic Engineering Company of California, Los Angeles 57, Calif.	941
*Electronic Enterprises, Inc., Newark 4, N. J.	545
*Electronic Products Company, Mount Vernon, N. Y.	557
*Electronic Specialty Co., Los Angeles 39, Calif.	169
Electronic Tube Corporation, Philadelphia 18, Penna.	170
*Electrons, Incorporated, Newark 3, N. J.	935
Electro-Voice, Inc., Buchanan, Mich.	649
*Electro Winders Co., El Monte, Calif.	984
Elgin Metalformers Corporation, Elgin, Ill.	902
*El-Rad Manufacturing Co., Chicago 18, Ill.	632
Eltran Corporation, St. Anne, Ill.	603
Emerson Radio & Phonograph Corp., Jersey City 2, N. J.	171
Ensign Coil Company, Chicago 23, Ill.	172
Erca Tool Die & Stamping Co., Brooklyn 22, N. Y.	762
Erie Resistor Corporation, Erie, Pa.	173
*Espey Manufacturing Company, Inc., New York 19, N. Y.	174
*Esquire Radio Corporation, Brooklyn 19, N. Y.	742
*Essex Electronics, Berkeley Heights, N. J.	425
*Essex Wire Corporation, Fort Wayne 6, Ind.	175
*Fada Radio & Electric Company, Inc., Belleville 9, N. J.	176
Farnsworth Electronics Company, Fort Wayne 1, Ind.	938
John E. Fast & Company, Chicago 41, Ill.	178
Federal Telephone and Radio Company, Clifton, N. J.	179
Federated Metals Division, American Smelting and Refining Co., New York 5, N. Y.	942
Feedback Controls, Inc., Alexandria, Va.	950
Fidelity Products Co., Inc., So. Orange, N. J.	494
*Filtors, Inc., Port Washington, L. I., N. Y.	977
Five Star Manufacturing Company, Houston 20, Tex.	958
*Florida-Merit Inc., Hollywood, Fla.	987
Forbes & Wagner, Inc., Silver Creek, N. Y.	701
Foto-Video Laboratories, Inc., Little Falls, N. J.	963
*The Forest Electric Company, Forest Park, Ill.	773
*Foster Transformer Company, Cincinnati 23, Ohio	394
Fretco Incorporated, Pittsburgh 13, Penna.	734
*L. H. Frost & Co., Inc., Grand Rapids 8, Mich.	746
*F. & V. Coil Winding Corporation, Newark 5, N. J.	572
*Garod Radio Corporation, Brooklyn 1, N. Y.	186
*Gates Radio Company, Quincy, Ill.	187
*Gavitt Wire & Cable Co., Division of American Hard Rubber Co., Brookfield, Mass.	360
*General Cable Corporation, Perth Amboy, N. J.	571
General Cement Mfg. Co., Rockford, Ill.	396
*General Communication Company, Boston 15, Mass.	459
General Electric Company, Syracuse 1, N. Y.	188
*General Electronics, Division of Arcturus Electronics Inc., Paterson 3, N. J.	189
The General Industries Company, Elyria, Ohio	190
General Instrument Corporation, Elizabeth 3, N. J.	191
General Magnetic Corporation, Detroit 34, Mich.	193
General Mills, Inc., Mechanical Division, Minneapolis 13, Minn.	927
General Products Corporation, Union Springs, N. Y.	913
General Radio Company, Cambridge 39, Mass.	194
General Railway Signal Company, Rochester 2, N. Y.	644
*General Transformer Company, Homewood, Ill.	412
General Transistor Corporation, Jamaica 35, N. Y.	990
Germanium Products Corporation, Sub. of Radio Development & Research Corp., Jersey City 4, N. J.	924
G & H Wood Products Company, Brooklyn 11, N. Y.	795
G. M. Giannini & Co., Inc., Pasadena 1, Calif.	943
Glaser-Steers Corporation, Belleville 9, N. J.	670
*Glass Products Company, Chicago 37, Ill.	475
The Fred Goat Co., Inc., Brooklyn 17, N. Y.	197
Good-All Electric Mfg. Co., Ogalalla, Nebr.	446
Goodline Corporation, Alhambra, Calif.	861
*Gonset Company, Inc., Burbank, Calif.	983
Gramer-Halldorson Transformer Corp., Chicago 39, Ill.	598
*Grand Ra-Tronics, Inc., Lab. of Grand Transformers, Inc., Grand Haven, Mich.	996
*Grand Transformers, Inc. Grand Haven, Mich.	757
Grayhill, La Grange, Ill.	992
Grigsby-Allison Company, Inc., Arlington Heights, Ill.	467
The Gudeman Company, Chicago 10, Ill.	438
*Edwin I. Guthman & Company Div., Chicago Standard Transformer Corp., Chicago 7, Ill.	198
The Hallicrafters Co., Chicago 24, Ill.	199
*Hamilton-Hall Mfg. Company, Milwaukee 2, Wis.	936
Hammarlund Mfg. Co., Inc., New York 1, N. Y.	201
Hardwick, Hindle, Inc., Newark 5, N. J.	411
Harman-Kardon, Inc., Westbury, Long Island, N. Y.	794
*Harnett Electric Corporation, Riverhead, N. Y.	481
Hawley Products Company, St. Charles, Ill.	204
Haydu Brothers of New Jersey (Sub. Burroughs Corp., Detroit), Plainfield, N. J.	205

Company	Code No.
*Henald Manufacturing Co., Piper City, Ill.	808
*Heppner Manufacturing Company, Round Lake, Ill.	575
The Hickok Electrical Instrument Co., Cleveland 8, O.	508
*Hillburn Electronic Products Co., Brooklyn 22, N. Y.	687
*Hinners-Galanek Radio Corp., Cavalier Radio & Television Div., Long Island City 6, N. Y.	786
Hi-Q Division Aerovox Corporation, Olean, N. Y.	163
Hoffman Electronics Corporation, Los Angeles 7, Calif.	207
John R. Hollingsworth Corporation, Clifton Heights, Pa.	659
*Holyoke Wire and Cable Corporation, Holyoke, Mass.	872
*Hopkins Engineering Company, Altadena 3, Calif.	791
Huggins Laboratories, Inc., Menlo Park, Calif.	964
Hughes Aircraft Company, Culver City, Calif.	744
Hydro-Aire, Inc., Sub. of Crane Co., Burbank, Calif.	877
Hy-Gain Television Products, Lincoln, Nebr.	894
*Illinois Condenser Company, Chicago 22, Ill.	616
The Indiana Steel Products Company, Valparaiso, Ind.	211
Industrial Development Engineering Associates, Inc., Indianapolis 26, Ind.	638
*Industrial Hardware Manufacturing Co., Inc., New York 12, N. Y.	866
Industrial Television, Inc., Clifton, N. J.	541
*Industrial Tubes, Inc., Geneva, Ill.	972
Insulated Circuits, Inc., West Caldwell, N. J.	944
International Electronics Industries, Inc., Nashville 1, Tenn.	911
International Instruments, Inc., New Haven 15, Conn.	855
International Rectifier Corporation, El Segundo, Calif.	845
International Resistance Company, Philadelphia 8, Pa.	214
International Telemeter Corp., Los Angeles 25, Calif.	887
Jackson Electrical Instrument Co., Dayton 2, Ohio	216
*James Vibrapowr Company, Chicago 18, Ill.	863
J-B-T Instruments, Inc., New Haven 8, Conn.	442
Jeffers Electronics Division, Speer Carbon Company, Dubois, Penna.	724
*Jefferson Electric Company, Bellwood, Ill.	218
Jefferson-Travis Incorporated, Sub. Emerson Radio & Phonograph Corp., Brooklyn, N. Y.	219
Jensen Manufacturing Company, Div. of The Muter Company, Chicago 38, Ill.	220
Jerrold Electronics Corporation, Philadelphia 3, Pa.	923
Jersey Specialty Co., Inc., Mountainview, N. J.	730
JFD Manufacturing Co., Inc., Brooklyn 4, N. Y.	221
*J & G Machine Company, Worcester 8, Mass.	945
E. F. Johnson Company, Waseca, Minn.	222
Johnson Electronics Inc., Orlando, Fla.	784
Johnson & Hoffman Manufacturing Co., Mineola, N. Y.	639
Kay Electric Company, Pine Brook, N. J.	620
Kay Lab., San Diego 12, Calif.	925
Kerrigan Lewis Manufacturing Co., Chicago 51, Ill.	223
Kester Solder Company, Chicago 39, Ill.	224
Keystone Electronics Company, Stamford, Conn.	699
Kimble Glass Company, Sub. of Owens-Illinois Glass Co., Toledo 1, Ohio	647
King Laboratories, Inc., Syracuse 3, N. Y.	225
Kip Electronics Corporation, Stamford, Conn.	593
Kline Iron and Metal Company, Columbia, S. C.	869
*The James Knights Company, Sandwich, Ill.	504
*Kobzy Tool Company, Chicago 22, Ill.	594
Kost Products Company, Inc., Chicago 39, Ill.	951
*Lear, Incorporated, Los Angeles 64, Calif.	227
*Lectrohm, Inc., Chicago 30, Ill.	974
Lenz Electric Manufacturing Co., Chicago 47, Ill.	228
*Leonard Electric Products Co., Inc., Brooklyn 32, N. Y.	570
Lewis and Kaufman, Ltd., Los Gatos, Calif.	738
Littelfuse, Incorporated, Des Plaines, Ill.	230
Litton Industries, Beverly Hills, Calif.	879
Lowell Manufacturing Company, St. Louis 17, Mo.	657
*Lytle Engineering & Mfg. Co., Chicago 3, Ill.	671
Machlett Laboratories, Incorporated, Springdale, Conn.	231
The Magnavox Company, Fort Wayne 4, Ind.	232
*Magnetic Coil Manufacturing Company, Chicago 22, Ill.	933
*Magnetic Windings Division (Essex Wire Corporation), Easton, Pa.	352
P. R. Mallory & Co., Inc., Indianapolis 6, Ind.	235
*Mark Electronics Inc., Newark 2, N. J.	806
H. S. Martin & Company, Evanston, Ill.	686
*Marvel Electric Corporation, Chicago 22, Ill.	989
McCoy Electronics Co., Mt. Holly Springs, Penna.	832
McGregor Electronic Industries, Inc., McGregor, Ia.	789
McIntosh Laboratory, Inc., Binghamton, N. Y.	793
Measurements Corporation, Boonton, N. J.	236
Mechanical Steel Tubing Corporation, Bronx 59, N. Y.	946
*Mel-Rain Corporation, Indianapolis 4, Ind.	834
*Merit Coil & Transformer Corp., Chicago 40, Ill.	239
Methode Manufacturing Corp., Chicago 47, Ill.	720
Micamold Electronics Manufacturing Corp., Brooklyn 37, N. Y.	240
Microtran Company Division, Crest Laboratories, Inc., Rockaway Beach 93, N. Y.	768
Microwave Associates, Inc., Boston 15, Mass.	803
Midland Manufacturing Co., Inc., Kansas City 15, Kan.	828
*Mid-West Coil & Transformer Co., Chicago 14, Ill.	549
Midwest Speaker Company, McGregor, Iowa	993
James Millen Manufacturing Co., Inc., Malden 48, Mass.	242
Milwaukee Resistor Company, Milwaukee 4, Wis.	722
*Model Engineering & Manufacturing, Inc., Chicago 18, Ill.	976
Moloney Electric Company, St. Louis 20, Mo.	965
Mosley Electronics, Incorporated, St. Louis 14, Mo.	750
Motorola Inc., Chicago 51, Ill.	185
Mullenbach Division of Electric Machinery Mfg. Co., Los Angeles 58, Calif.	966
Multi-Tron Laboratory, Chicago 44, Ill.	693
*Muntz TV, Inc., Chicago 13, Ill.	772
The Muter Company, Chicago 5, Ill.	244
Mycalex Corporation of America, Clifton, N. J.	642
National Aeronautical Corporation, Ambler, Pa.	643
*National Company, Inc., Malden 48, Mass.	245
National Electric Products Corp., Pittsburgh 22, Penna.	769
*National Electronics, Inc., Geneva, Ill.	749
National Fabricated Products, Div. of Hoffman Electronics Corp., Chicago 47, Ill.	246
National Moldite Company, Hillside 5, N. J.	367
*National Video Corporation, Chicago 32, Ill.	836
*Newcomb Electronics Corporation, Hollywood 38, Calif.	437
New York Transformer Co., Inc., Alpha, N. J.	366
North American Aviation, Inc., Downey, Calif.	967
North American Philips Company, Inc., New York 17, N. Y.	423
*Northwest Plastics, Inc., St. Paul 1, Minn.	723
Oak Electronics Company, Buffalo 3, N. Y.	739
Oak Mfg. Co., Chicago 10, Ill.	249
*Oaktron Electric Company, Tinley Park, Ill.	934
*Oaktron Industries Inc., Monroe, Wis.	918
*Ogden Coil & Transformer Co., Chicago 12, Ill.	776
The Ohio Carbon Company, Cleveland 11, Ohio	250
Ohmite Manufacturing Company, Skokie, Ill.	251
Olympic Metal Products Co., Inc., Alpha 1, N. J.	740
Olympic Radio & Television Inc., Long Island City 1, N. Y.	200
Onondaga Pottery Company, Electronics Division, Syracuse 1, N. Y.	848
*Ontario Industries, Inc., Hornell, N. Y.	960
Orradio Industries, Inc., Opelika, Ala.	840
Otis Radio & Electric Corp., Hawarden, Iowa	552
Oxford Electric Corporation, Chicago 15, Ill.	465
Pacific Semiconductors, Inc., Culver City, Calif.	947
Packard-Bell Company, Los Angeles 64, Calif.	254
Pan-Electronics Corporation, Griffin, Ga.	904
Parisian Novelty Company, Chicago 9, Ill.	257
Parker Metal Goods Company, Worcester 8, Mass.	929
*Paul & Beekman, Inc., Philadelphia 40, Pa.	736
*PCA Electronics Inc., Santa Monica, Calif.	973
Penn Television Products Company, Philadelphia 34, Pa.	726
Penn Tran Corporation, Bellefonte, Pa.	665
Penta Laboratories, Inc., Santa Barbara, Calif.	771
*Perfection Electric Company, Chicago 16, Ill.	592
Permoflux Corporation, Chicago 39, Ill.	258
*Permoflux Corporation, Glendale 4, Calif.	395
Permo, Incorporated, Chicago 26, Ill.	259
*Phalo Plastics Corporation, Worcester 8, Mass.	697
Phen-O-Tron, Inc., New Rochelle, N. Y.	876
Philco Corporation, Philadelphia 34, Pa.	260
Philmore Manufacturing Co., Inc., New York 3, N. Y.	262
*Pickering and Company, Inc., Oceanside, N. Y.	631
Pilot Radio Corporation, Long Island City 1, N. Y.	264
Pioneer Electronics Corporation, Los Angeles 64, Calif.	706
Plamondon Magnetics Company, Chicago 22, Ill.	882
*Planet Manufacturing Corporation, Bloomfield, N. J.	761
*Plastoid Corporation, Hamburg, N. J.	435
*Polan Industries, Inc., Huntington 19, W. Va.	621
Polarad Electronics Corporation, Long Island City 1, N. Y.	562
*Polyphase Engineering, Chicago 22, Ill.	889
Precision Apparatus Company, Inc., Glendale 27, Long Island, N. Y.	505
*Precision Coil Manufacturing Company, Santa Monica, Calif.	982
Precision Electronics Inc., Franklin Park, Ill.	871
Premax Products Division, Chisholm-Ryder Co., Inc., Niagara Falls, N. Y.	267
Prodelin, Inc., Kearny, N. J.	703
*Pyramid Electric Company, North Bergen, N. J.	472
*Q. L. C. Corporation, Summit, N. J.	464
Quam-Nichols Company, Chicago 37, Ill.	270
Quincy Speaker Manufacturing Corp., Quincy, Ill.	767
Rada Products Co., Chicago 12, Illinois	482
Radio Condenser Company, Camden 3, N. J.	273
Radio Corporation of America, Camden, N. J.	274
*The Radio Craftsmen, Inc., Chicago 40, Ill.	275
Radio Engineering Laboratories, Inc., Long Island City 1, N. Y.	276

Company	Code No.
*Radio Industries, Inc., Chicago 40, Ill.	540
Radio Materials Corporation, Chicago 18, Ill.	732
*The Radion Corporation, Chicago 14, Ill.	700
*Radio Receptor Company, Inc., New York 11, N. Y.	380
Radio Specialty Manufacturing Co., Portland 14, Oregon	587
*Radio and Television Inc., New York 19, N. Y.	278
*Radio Television Products Corp., Grass Lake, Mich.	489
The Radix Wire Company, Euclid 32, Ohio	948
RAM Electronics, Inc., Irvington-on-Hudson, N. Y.	617
Rapid Die and Molding Co., Schiller Park, Ill.	968
*Ratel, Inc., Goleta, Calif.	835
Ratigan Electronics Inc., Los Angeles 11, Calif.	979
Raytheon Manufacturing Company, Waltham 54, Mass.	280
Raytronic Laboratories, Inc., Cincinnati 15, Ohio	930
Rea Magnet Wire Company, Inc., Fort Wayne 4, Ind.	281
Rectifier Corporation, Fajardo, Puerto Rico	844
*Red Lion Cabinet Company, Red Lion, Pa.	384
Reeves-Hoffman Corporation, Carlisle, Pa.	969
Remler Company, San Francisco 10, Calif.	284
Resitron Laboratories, Inc., Santa Monica, Calif.	917
Rhein Sound Systems, Inc., Marion, Ill.	952
Richardson Company, Hollywood 28, Calif.	919
*Richmond Radionics Corp., Delavan, Wis.	796
*The Rodefer-Gleason Glass Company, Bellaire, Ohio	709
*Rogers Electronic Corp., New York 12, N. Y.	677
The Rola Company, Inc., Div. of The Muter Company, Cleveland 14, Ohio	285
*Rollan Electric Co., Chicago 19, Ill.	721
*Rollins Corporation, Lewes, Del.	915
The Ross Manufacturing Company, Chicago 40, Ill.	286
*Rowe Industries, Toledo 9, Ohio	580
*Russell Speaker Company, Chicago 29, Ill.	748
S & A Electronics, Toledo 5, Ohio	872
*Sampson Electric Products Co., Clinton, N. C.	518
San Fernando Electric Mfg. Co., San Fernando, Calif.	815
Sangamo Electric Company, Marion, Ill.	658
*Santay Corporation, Chicago 24, Ill.	368
*Sarkes Tarzian, Inc., Bloomington, Ind.	684
Schneider & Marquard, Inc., Brooklyn 17, N. Y.	320
*Schulmerich Electronics, Inc., Sellersville, Penna.	428
Scientific Radio Products, Inc., Omaha 8, Nebr.	953
J. P. Seeburg Corporation, Chicago 22, Ill.	289
Sentinel Radio Corporation, Evanston, Ill.	291
Sheffco Mfg. Corp., Palisades Park, N. J.	698
*Sherold Crystals Inc., Kansas City 8, Mo.	975
*Shoup Engineering Company, Chicago 4, Ill.	674
Shure Brothers, Incorporated, Chicago 10, Ill.	590
Shurite Meters (J-B-T Instruments, Inc.), New Haven 8, Conn.	484
F. W. Sickles Division, Sub. of General Instrument Corp., Chicopee, Mass.	294
Simpson Electric Company, Chicago 44, Ill.	614
*Mark Simpson Manufacturing Co., Inc., Long Island City 3, N. Y.	295
Skiatron Electronics & Television Corp., New York 3, N. Y.	931
*Solar Manufacturing Corporation, Los Angeles 58, Calif.	296
*Sonora Radio & Television Corp., Chicago 12, Ill.	297
*Sonotone Corporation, Elmsford, N. Y.	787
*Soreng Products Corporation, Schiller Park, Ill.	711
Southern Electronics Company, Greeneville, Tenn.	891
*Sparton Electronics Division, The Sparks-Withington Company, Jackson, Mich.	299
Special Products Company, Rockville, Md.	474
Speer Resistor Division, Speer Carbon Company, St. Marys, Penna.	300
Spencer Kennedy Laboratories, Inc., Boston 35, Mass.	782
*Sperti Faraday Inc., Cincinnati 2, Ohio	302
Sprague Electric Company, North Adams, Mass.	303
Sprague of Wisconsin, Inc., Grafton, Wis.	457
Stackpole Carbon Company, St. Marys 3, Pa.	304
*Standard Coil Products Co. Inc., Melrose Park, Ill.	305
*Standard Condenser Company, Chicago 13, Ill.	710
Standard Crystal Company, Kansas City 8, Mo.	995
*Standard Electrical Products Co., Dayton 3, Ohio	668
Standard Electronics Corporation, Sub. of Dynamics Corp. of America, Newark 5, N. J.	694
Standard Electronics, Division of Hupp Corp., Carlisle, Pa.	501
Standard Television Tube Corp., New Orleans 12, La.	922
*Standard Winding Company, Newburgh, N. Y.	550
*Stanwyck Winding Company, Newburgh, N. Y.	574
*Star Products Company, Chicago 16, Ill.	613
The Staver Company Incorporated, Bay Shore, L. I.	504
Stewart-Warner Electronics, Div. of Stewart-Warner Corporation, Chicago 51, Ill.	307
*Stoddart Aircraft Radio Co., Hollywood 38, Calif.	369
Stone City Machine & Tool Co., Inc., Bedford, Ind.	770
Stromberg-Carlson Company, Div. of General Dynamics Corp., Rochester 3, N. Y.	308
*Stupakoff Ceramic & Mfg. Co., Latrobe, Penna.	309
Superior Tube Company, Norristown, Pa.	310
Supreme, Incorporated, Greenwood, Miss.	311
*Supreme Transformer Corporation, Chicago 39, Ill.	798
Surprenant Mfg. Co., Boston 8, Mass.	624
Sylvania Electric Products Inc., New York 19, N. Y.	312
Symphonic Radio and Electronic Corp., Boston 14, Mass.	351
*Syntronic Instruments, Inc., Addison, Ill.	822
Talk-A-Phone Co., Chicago 23, Ill.	132
Tansitor Electronics, Inc., Bennington, Vt.	988
Taylor Tubes, Inc., Chicago 47, Ill.	713
*Tech-Master Corporation, New York 13, N. Y.	679
*Technical Appliance Corp., Sherburne, N. Y.	737
Technical Training Institute, Portland 11, Ore.	921
TelAutograph Corporation, Los Angeles 19, Calif.	970
Telechrome Incorporated, Amityville, N. Y.	868
*Tele King Corporation, New York 1, N. Y.	583
*Telequip Radio Company, Chicago 8, Ill.	454
*Teleradio Engineering Corporation, Wilkes Barre, Pa.	357
Televideo Corporation of America, Los Angeles 12, Calif.	952
Tel-Instrument Electronics Corp., Carlstadt, N. J.	536
*Tele-Ray Tube Co., Inc., Yonkers, N. Y.	864
*Tel-O-Tube Corporation of America, East Paterson, N. J.	818
*TELvision Laboratories, Inc., Wauconda, Ill.	608
*Tempel Manufacturing Company, Chicago 26, Ill.	745
Tempo T.V. Mfg. Corp., Canoga Park, Calif.	802
The Tetrad Company, Yonkers 2, N. Y.	842
Texas Electronics Mfg. Co., Inc., Houston, Tex.	916
Texas Instruments Incorporated, Dallas 9, Tex.	980
*Thermador Electrical Mfg. Co., Los Angeles 22, Calif.	825
*Thomas & Skinner Steel Products Co., Indianapolis 7, Ind.	318
Thomas Electronics, Inc., Passaic, N. J.	672
*Thordarson-Meissner, Mt. Carmel, Ill.	238
*Todd Electric Company, Inc., Yonkers, N. Y.	928
*Todd Products Co., Inc., Mt. Vernon, N. Y.	634
*Todd-Tran Corp., Mt. Vernon, N. Y.	635
*B. J. Toegel, Inc., Plainfield, N. J.	548
*Trad Electronics Corporation, Asbury Park, N. J.	688
*Transitron Electronic Corporation, Melrose 76, Mass.	959
Translite Electronics Corp., Chicago 39, Ill.	810
*Trans-Vue Corporation, Chicago 16, Ill.	217
Trav-Ler Radio Corporation, Chicago 6, Ill.	320
Tresco (Transformer and Electronics Specialties Company), Philadelphia 28, Pa.	897
*Triad Transformer Corporation, Venice, Calif.	830
Triplett Electrical Instrument Co., Bluffton, Ohio	321
Tristao Manufacturing Co., Tulare, Calif.	874
*Triwec-Transformer Company, Chicago 18, Ill.	524
Tung-Sol Electric Inc., Newark 4, N. J.	322
The Turner Company, Cedar Rapids, Iowa	696
*TV Products Division, Union Electric & Mfg. Co. Jersey City 7, N. J.	818
*The Ucinite Company, Newtonville 60, Mass.	381
U M & F Manufacturing Corp., North Hollywood, Calif.	859
Union City Filament Corp., Union City, N. J.	954
*Union Electric & Manufacturing Co., Jersey City 7, N. J.	804
United Condenser Corporation, New York 56, N. Y.	516
United Electronics Company, Newark 4, N. J.	323
*United Electronic Manufacturing Corp., Union City, N. J.	820
United States Dynamics Corporation, Boston 20, Mass.	997
United States Electronic Research and Development Corp., Detroit 16, Mich.	955
*United States Radium Corporation, New York 7, N. Y.	324
*United Transformer Corporation, New York 13, N. Y.	418
Universal Company, High Point, N. C.	756
University Loudspeakers, Inc., White Plains, N. Y.	847
*Utah Radio Products Co., Inc., Huntington, Ind.	328
Vacuum Tube Products Co., Inc., Oceanside, Calif.	781
Valpey Crystal Corporation, Holliston, Mass.	527
Varian Associates, Palo Alto, Calif.	809
Vector Electronic Company, Los Angeles 65, Calif.	971
Vega Electronics Corporation, West Los Angeles 25, Calif.	981
Vidaire Electronics Mfg. Co., Lynbrook, L. I., N. Y.	797
*Videocraft Manufacturing Co., Chicago 39, Ill.	824
Viking Electric, Div. of Viking Industries, Inc., Canoga Park, Calif.	896
Vitramon, Inc., Bridgeport 1, Conn.	956
*V-M Corporation, Benton Harbor, Mich.	857
Vokar Corporation, Dexter, Mich.	168
Volkert Stampings, Inc., Queens Village 29, L. I., N. Y.	507
*Waldom Electronics, Inc., Chicago 10, Ill.	555
Walsco Electronics Corporation, Los Angeles 16, Calif.	287
*Ward Leonard Electric Co., Mount Vernon, N. Y.	532
*Ward Products Corporation, Division of The Gabriel Company, Cleveland 15, Ohio	331
Warwick Manufacturing Corporation, Chicago 44, Ill.	332
Waterman Products Company, Inc., Philadelphia 25, Pa.	431
Waters Conley Company, Inc., Rochester, Minn.	382

Company	Code No.
*Webster-Chicago Corporation, Chicago 39, Ill.	375
Weller Electric Corporation, Easton, Pa.	662
Wells-Gardner & Co., Chicago 39, Ill.	334
Wm. H. Welsh Co., Inc., Chicago 16, Ill.	335
*Wesco Electric Company, Inc., Chicago 31, Ill.	553
Western Electric Company, Inc., New York 5, N. Y.	336
Westinghouse Electric Corporation, Baltimore 3, Md.	337
Weston Electrical Instrument Corp., Newark 5, N. J.	338
*The Wheeler Insulated Wire Company, Inc., Waterbury 20, Conn.	392
Wheeler Laboratories, Inc., Great Neck, N. Y.	529
*Wilcox Electric Company, Inc., Kansas City 27, Mo.	339
Wind Turbine Company, West Chester, Pa.	653
Winston Electronics, Inc., Philadelphia 27, Pa.	957
Wire Company of America, Santa Barbara, Calif.	890
*Wirt Company, Philadelphia 44, Penna.	406
W. M. C. Inc., Chicago 47, Ill.	584
*Woodward-Schumacher Electric Corp., Chicago 22, Ill.	606
*Worthco Corporation, Beverly Hills, Calif.	785
Wright Zimmerman, Inc., New Brighton, Minn.	683
The Yale & Towne Manufacturing Co., Powdered Metal Products Division, Franklin Park, Ill.	539
*The Zell Products Corp., Norwalk, Conn.	342
Zenith Radio Corporation, Chicago 39, Ill.	343
Z & W Machine Products Inc., Wickliffe, Ohio	819

NUMERICAL LIST

RETMA Production Source Code Symbols

January 1, 1956

(* Indicates non-members)

Code No.	Company
101	*Admiral Corporation, Chicago 47, Ill.
102	Aerovox Corporation, New Bedford, Mass.
105	CBS-Columbia, Division of Columbia Broadcasting System, Inc., Long Island City 1, N. Y.
106	Allen-Bradley Company, Milwaukee 4, Wis.
107	The Alliance Manufacturing Co., Inc., Alliance, Ohio
109	American Condenser Company, Chicago 40, Ill.
110	All Star Products, Inc., Defiance, Ohio
111	Amperex Electronic Corporation, Hicksville, L. I., N. Y.
112	*Amy, Aceves & King, Inc., New York 36, N. Y.
113	*Andrea Radio Corporation, Long Island City 1, N. Y.
115	A. R. F. Products, Inc., River Forest, Ill.
116	The Arnold Engineering Company, Sub. of Allegheny Ludlum Steel Corp., Marengo, Ill.
119	*Automatic Manufacturing Corp., Newark 4, N. J.
120	Automatic Radio Mfg. Co., Inc., Boston 15, Mass.
122	The Bead Chain Manufacturing Co., Bridgeport 5, Conn.
125	Bendix Radio, Division of Bendix Aviation Corporation, Baltimore 4, Md.
128	Bliley Electric Company, Erie, Pa.
132	Talk-A-Phone Co., Chicago 23, Ill.
133	C. F. Cannon Co., Springwater, N. Y.
134	Centralab, Div. of Globe-Union Inc., Milwaukee 1, Wis.
135	Chicago Condenser Corporation, Chicago 47, Ill.
137	Chicago Telephone Supply Corp., Elkhart, Ind.
138	Chicago Standard Transformer Corp., Chicago 18, Ill. (Chicago Division)
139	Cinch Manufacturing Corporation, Chicago 24, Ill.
140	Clarostat Mfg. Co., Inc., Dover, New Hampshire
141	*Coil Engineering & Mfg. Co., Inc., Roanoke, Ind.
145	*Consolidated Radio Products Co., Chicago 10, Ill.
146	Continental Carbon Inc., Cleveland 11, Ohio
148	Corning Glass Works, Corning, N. Y.
149	Cornish Wire Company, Inc., New York 7, N. Y.
150	*Crescent Industries, Inc., Chicago 31, Ill.
151	Croname, Incorporated, Chicago 13, Ill.
152	Crosley Radio and Television Division, Avco Manufacturing Corporation, Cincinnati 25, Ohio
154	*Tobe Deutschmann Corporation, Norwood, Mass.
155	DeWald Radio Mfg. Corp., Long Island City 1, N. Y.
156	Wilbur B. Driver Company, Newark 4, N. J.
157	*Dumont-Airplane & Marine Instruments, Inc., New York 5, N. Y.
158	Allen B. DuMont Laboratories, Inc., Clifton, N. J.
159	*DX Radio Products Company, Inc., Chicago 47, Ill.
160	Hugh H. Eby, Inc., Philadelphia 44, Pa.
161	Eckstein Radio & Television Co., Minneapolis 6, Minn.
162	Eitel-McCullough, Inc., San Bruno, Calif.
163	Hi-Q Division Aerovox Corporation, Olean, N. Y.
164	The Electro Motive Mfg. Co., Inc., Willimantic, Conn.
166	*Chicago Electronic Engineering Co., Chicago 47, Ill.
168	Vokar Corporation, Dexter, Michigan
169	*Electronic Specialty Co., Los Angeles 39, Calif.
170	Electronic Tube Corporation, Philadelphia 18, Pa.
171	Emerson Radio & Phonograph Corp., Jersey City 2, N. J.
172	Ensign Coil Company, Chicago 23, Ill.
173	Erie Resistor Corporation, Erie, Pa.
174	*Espey Manufacturing Company, Inc., New York 19, N. Y.
175	*Essex Wire Corporation, Fort Wayne 6, Ind.
176	*Fada Radio & Electric Company, Inc., Belleville 9, N. J.
177	Capehart-Farnsworth Company, Fort Wayne 1, Ind.
178	John E. Fast & Company, Chicago 41, Ill.
179	Federal Telephone and Radio Company, Clifton, N. J.
185	Motorola Inc., Chicago 51, Ill.
186	*Garod Radio Corporation, Brooklyn 1, N. Y.
187	*Gates Radio Company, Quincy, Ill.
188	General Electric Company, Syracuse 1, N. Y.
189	*General Electronics, Division of Arcturus Electronics Inc., Paterson 3, N. J.
190	The General Industries Company, Elyria, Ohio
191	General Instrument Corporation, Elizabeth 3, N. J.
193	General Magnetic Corporation, Detroit 34, Mich.
194	General Radio Company, Cambridge 39, Mass.
197	The Fred Goat Co., Inc., Brooklyn 17, N. Y.
198	*Edwin I. Guthman & Company Div., Chicago Standard Transformer Corp., Chicago 7, Ill.
199	The Hallicrafters Company, Chicago 24, Ill.
200	Olympic Radio & Television Inc., Long Island City 1, N. Y.
201	Hammarlund Mfg. Co., Inc., New York 1, N. Y.
204	Hawley Products Company, St. Charles, Ill.
205	Haydu Brothers of New Jersey (Sub. Burroughs Corp., Detroit), Plainfield, N. J.
207	Hoffman Electronics Corporation, Los Angeles 7, Calif.
210	CBS-Hytron, Division of Columbia Broadcasting System, Inc., Danvers, Mass.
211	The Indiana Steel Products Company, Valparaiso, Ind.
214	International Resistance Company, Philadelphia 8, Pa.
216	Jackson Electrical Instrument Co., Dayton 2, Ohio
217	*Trans-Vue Corporation, Chicago 16, Ill.
218	*Jefferson Electric Company, Bellwood, Ill.
219	Jefferson-Travis Incorporated, Sub. Emerson Radio & Phonograph Corp., Brooklyn, N. Y.
220	Jensen Manufacturing Company, Div. of The Muter Company, Chicago 38, Ill.
221	JFD Manufacturing Co., Inc., Brooklyn 4, N. Y.
222	E. F. Johnson Company, Waseca, Minn.
223	Kerrigan Lewis Manufacturing Co., Chicago 51, Ill.
224	Kester Solder Company, Chicago 39, Ill.
225	King Laboratories, Inc., Syracuse 3, N. Y.
227	*Lear, Incorporated, Los Angeles 64, Calif.
228	Lenz Electric Manufacturing Co., Chicago 47, Ill.
230	Littelfuse, Incorporated, Des Plaines, Ill.
231	Machlett Laboratories, Incorporated, Springdale, Conn.
232	The Magnavox Company, Fort Wayne 4, Ind.
235	P. R. Mallory & Co., Inc., Indianapolis 6, Ind.
236	Measurements Corporation, Boonton, N. J.
238	*Thordarson-Meissner, Mt. Carmel, Ill.
239	*Merit Coil & Transformer Corp., Chicago 40, Ill.
240	Micamold Electronics Manufacturing Corp., Brooklyn 37, N. Y.
242	James Millen Manufacturing Co., Inc., Malden 48, Mass.
244	The Muter Company, Chicago 5, Ill.
245	*National Company, Inc., Malden 48, Mass
246	National Fabricated Products, Div. of Hoffman Electronics Corp., Chicago 47, Ill.
248	Arvin Industries, Inc., Columbus, Ind.
249	Oak Mfg. Co., Chicago 10, Ill.
250	The Ohio Carbon Company, Cleveland 11, Ohio
251	Ohmite Manufacturing Company, Skokie, Ill.
252	DuKane Corporation, St. Charles, Ill.
254	Packard-Bell Company, Los Angeles 64, Calif.

Code No.	Company
257	Parisian Novelty Company, Chicago 9, Ill.
258	Permoflux Corporation, Chicago 39, Ill.
259	Permo, Incorporated, Chicago 26, Ill.
260	Philco Corporation, Philadelphia 34, Pa.
262	Philmore Manufacturing Co., Inc., New York 3, N. Y.
264	Pilot Radio Corporation, Long Island City 1, N. Y.
267	Premax Products Division, Chisholm-Ryder Co., Inc., Niagara Falls, N. Y.
270	Quam-Nichols Company, Chicago 37, Ill.
273	Radio Condenser Company, Camden 3, N. J.
274	Radio Corporation of America, Camden, N. J.
275	*The Radio Craftsmen, Inc., Chicago 40, Ill.
276	Radio Engineering Laboratories, Inc., Long Island City 1, N. Y.
278	*Radio and Television Inc., New York 19, N. Y.
280	Raytheon Manufacturing Company, Waltham 54, Mass.
281	Rea Magnet Wire Company, Inc., Fort Wayne 4, Ind.
284	Remler Company, San Francisco 10, Calif.
285	The Rola Company, Inc., Div. of The Muter Company, Cleveland 14, Ohio
286	The Ross Manufacturing Company, Chicago 40, Ill.
287	Walsco Electronics Corporation, Los Angeles 16, Calif.
289	J. P. Seeburg Corporation, Chicago 22, Ill.
291	Sentinel Radio Corporation, Evanston, Ill.
294	F. W. Sickles Division, Sub. of General Instrument Corp., Chicopee, Mass.
295	*Mark Simpson Manufacturing Co., Inc. Long Island City 3, N. Y.
296	*Solar Manufacturing Corporation, Los Angeles 58, Calif.
297	*Sonora Radio & Television Corp., Chicago 12, Ill.
299	*Sparton Electronics Division, The Sparks-Withington Company, Jackson, Mich.
300	Speer Resistor Corporation, Saint Marys, Pa.
302	*Sperti Faraday Inc., Cincinnati 2, Ohio
303	Sprague Electric Company, North Adams, Mass.
304	Stackpole Carbon Company, St. Marys 3, Pa.
305	*Standard Coil Products Co. Inc., Melrose Park, Ill.
306	Chicago Standard Transformer Corp., Chicago 18, Ill. (Standard Division)
307	Stewart-Warner Electronics, Div. of Stewart-Warner Corporation, Chicago 51, Ill.
308	Stromberg-Carlson Company, Div. of General Dynamics Corp., Rochester 3, N. Y.
309	*Stupakoff Ceramic & Mfg. Co., Latrobe, Penna.
310	Superior Tube Company, Norristown, Pa.
311	Supreme, Incorporated, Greenwood, Miss.
312	Sylvania Electric Products Inc., New York 19, N. Y.
318	*Thomas & Skinner Steel Products Co., Indianapolis 7, Ind.
320	Trav-Ler Radio Corporation, Chicago 6, Ill.
321	Triplett Electrical Instrument Co., Bluffton, Ohio
322	Tung-Sol Electric Inc., Newark 4, N. J.
323	United Electronics Company, Newark 4, N. J.
324	*United States Radium Corporation, New York 7, N. Y.
328	*Utah Radio Products Co., Inc., Huntington, Ind.
331	*Ward Products Corporation, Division of The Gabriel Company, Cleveland 15, Ohio
332	Warwick Manufacturing Corporation, Chicago 44, Ill.
334	Wells-Gardner & Co., Chicago 39, Ill.
335	Wm. H. Welsh Co., Inc., Chicago 16, Ill.
336	Western Electric Company, Inc., New York 5, N. Y.
337	Westinghouse Electric Corporation, Baltimore 3, Md.
338	Weston Electrical Instrument Corp., Newark 5, N. J.
339	*Wilcox Electric Company, Inc., Kansas City 27, Mo.
342	*The Zell Products Corp., Norwalk, Conn.
343	Zenith Radio Corporation, Chicago 39, Ill.
345	*The Astatic Corporation, Conneaut, Ohio
351	Symphonic Radio and Electronic Corp., Boston 14, Mass.
352	*Magnetic Windings Division, Essex Wire Corporation, Easton, Penna.
357	*Teleradio Engineering Corporation, Wilkes Barre, Pa.
360	*Gavitt Wire & Cable Co., Division of American Hard Rubber Co., Brookfield, Mass.
366	New York Transformer Co., Inc., Alpha, N. J.
367	National Moldite Company, Hillside 5, N. J.
368	*Santay Corporation, Chicago 24, Ill.
369	*Stoddart Aircraft Radio Co., Hollywood 38, Calif
370	*Carr Fastener Company, Division of United-Carr Fastener Corp., Cambridge 42, Mass.
371	*Best Manufacturing Co., Inc., Irvington 11, N. J.
372	*Holyoke Wire and Cable Corporation, Holyoke, Mass.
375	*Webster-Chicago Corporation, Chicago 39, Ill.
380	*Radio Receptor Company, Inc., New York 11, N. Y.
381	*The Ucinite Company, Newtonville 60, Mass.
382	Waters Conley Company, Inc., Rochester, Minn.
384	*Red Lion Cabinet Company, Red Lion, Pa.
385	*Dearborn Glass Company, Bedford Park, Ill.

Code No.	Company
391	Altec Lansing Corporation, Beverly Hills, Calif.
392	*The Wheeler Insulated Wire Company, Inc., Waterbury, 20, Conn.
394	*Foster Transformer Company, Cincinnati 23, Ohio
395	*Permoflux Corporation, Glendale 4, Calif.
396	General Cement Mfg. Co., Rockford, Ill.
402	Andrew Corporation, Chicago 19, Ill.
406	*Wirt Company, Philadelphia 44, Penna.
409	British Industries Corporation, Port Washington, L. I., N. Y. N. J.
411	Hardwick, Hindle, Inc., Newark 5, N. J.
412	*General Transformer Company, Homewood, Ill.
413	*Acme Electric Corporation, Cuba, N. Y.
418	*United Transformer Corporation, New York 13, N. Y.
423	North American Philips Company, Inc., New York 17, N. Y.
425	*Essex Electronics, Berkeley Heights, N. J.
427	Communication Measurements Laboratory, Inc., Plainfield, N. J.
428	*Schulmerich Electronics, Inc., Sellersville, Penna.
431	Waterman Products Company, Inc., Philadelphia 25, Pa.
433	*Cleveland Electronics, Inc., Cleveland 3, Ohio
435	*Plastoid Corporation, Hamburg, N. J.
437	*Newcomb Electronics Corporation, Hollywood 38, Calif.
438	The Gudeman Company, Chicago 10, Ill.
439	Collins Radio Company, Cedar Rapids, Ia.
440	Cannon Electric Company, Los Angeles 31, Calif.
442	J-B-T Instruments, Inc., New Haven 8, Conn.
446	Good-All Electric Mfg. Co., Ogallala, Nebr.
450	*Columbus Process Co., Inc., Columbus, Ind.
454	*Telequip Radio Company, Chicago 8, Ill.
457	Sprague of Wisconsin, Inc., Grafton, Wis.
459	*General Communication Company, Boston 15, Mass.
461	Barker & Williamson, Inc., Upper Darby, Pa.
464	*Q. L. C. Corporation, Summit, N. J.
465	Oxford Electric Corporation, Chicago 15, Ill.
466	Delco Radio Division, General Motors Corporation, Kokomo, Ind.
467	Grigsby-Allison Company, Inc., Arlington Heights, Ill
472	*Pyramid Electric Company, North Bergen, N. J.
474	Special Products Company, Rockville, Md.
475	*Glass Products Company, Chicago 37, Ill.
476	*Airdesign, Incorporated, Upper Darby, Penna.
481	*Harnett Electric Corporation, Riverhead, N. Y.
482	Rada Products Co., Chicago 12, Ill.
484	*Shurite Meters (J-B-T Instruments, Inc.), New Haven 8, Conn.
489	*Radio Television Products Corp., Grass Lake, Mich.
493	*Dormitzer Electric & Manufacturing Co. Inc., Cambridge 40, Mass.
494	Fidelity Products Co., Inc., So. Orange, N. J.
501	Standard Electronics, Division of Hupp Corp., Carlisle, Pa.
502	*American Radio Hardware Co., Inc., Mt. Vernon, N. Y.
503	Caledonia Electronics & Transformer Corp., Caledonia, N. Y.
504	*The James Knights Company, Sandwich, Ill.
505	Precision Apparatus Company, Inc., Glendale 27, Long Island, N. Y.
507	Volkert Stampings, Inc., Queens Village 29, L. I., N. Y.
508	The Hickok Electrical Instrument Co., Cleveland 8, O.
514	*Audio Electric Company, Chicago 26, Ill.
515	*Electronic Components Corporation, Chicago 8, Ill.
516	United Condenser Corporation, New York 56, N. Y.
518	*Sampson Electric Products Co., Clinton, N. C.
520	Schneider & Marquard, Inc., Brooklyn 17, N. Y.
524	*Triwec Transformer Company, Chicago 18, Ill.
525	Crucible Steel Company of America, New York 17, N. Y.
527	Valpey Crystal Corporation, Holliston, Mass.
529	Wheeler Laboratories, Inc., Great Neck, N. Y.
530	*Clippard Instrument Laboratory, Inc., Cincinnati 31, Ohio
532	*Ward Leonard Electric Co., Mount Vernon, N. Y.
536	Tel-Instrument Electronics Corp., Carlstadt, N. J.
539	The Yale & Towne Manufacturing Co., Powdered Metal Products Division, Franklin Park, Ill.
540	*Radio Industries, Inc., Chicago 40, Ill.
541	Industrial Television, Inc., Clifton, N. J.
545	*Electronic Enterprises, Inc., Newark 4, N. J.
547	*Anaconda Wire & Cable Company, Hastings-On-Hudson 6, N. Y.
548	*B. J. Toegel, Inc., Plainfield, N. J.
549	*Mid-West Coil & Transformer Co., Chicago 14, Ill.
550	*Standard Winding Company, Newburgh, N. Y.
551	American Television & Radio Co., St. Paul 1, Minn.
552	Otis Radio & Electric Corp., Hawarden, Iowa
553	*Wesco Electric Company, Inc., Chicago 31, Ill.
554	American Phenolic Corporation, Chicago 50, Ill.
555	*Waldom Electronics, Inc., Chicago 10, Ill.
557	*Electronic Products Company, Mount Vernon, N. Y.

Code No.	Company
562	Polarad Electronics Corporation, Long Island City 1, N. Y.
563	J. W. Davis & Company, Dallas 9, Texas
569	*Electrical Utilities Company, La Salle, Ill.
570	*Leonard Electric Products Co., Inc., Brooklyn 32, N. Y.
571	*General Cable Corporation, Perth Amboy, N. J.
572	*F. & V. Coil Winding Corporation, Newark 5, N. J.
573	Alcon Metal Products, Inc., Chicago 47, Ill.
574	*Stanwyck Winding Company, Newburgh, N. Y.
575	*Heppner Manufacturing Company, Round Lake, Ill.
579	Belden Manufacturing Company, Chicago 44, Ill.
580	*Rowe Industries, Toledo 9, Ohio
581	*Aircraft-Marine Products, Inc., Harrisburg, Pa.
583	*Tele King Corporation, New York 1, N. Y.
584	W. M. C. Inc., Chicago 47, Ill.
586	Drake Manufacturing Company, Chicago 22, Ill.
587	Radio Specialty Manufacturing Co., Portland 14, Ore.
588	Barnes Metal Products Company, Chicago 23, Ill.
589	David Bogen Co., Inc., New York 14, N. Y.
590	Shure Brothers, Inc., Chicago 10, Ill.
592	*Perfection Electric Company, Chicago 16, Ill.
593	Kip Electronics Corporation, Stamford, Conn.
594	*Kobzy Tool Company, Chicago 22, Ill.
596	Gramer-Halldorson Transformer Corp., Chicago 39, Ill.
599	*Elco Corporation, Philadelphia 40, Pa.
603	Eltran Corporation, St. Anne, Ill.
604	The Staver Company Incorporated, Bay Shore, L. I.
606	*Woodward-Schumacher Electric Corp., Chicago 22, Ill.
607	Consolidated Wire & Associated Companies, Chicago 16, Ill.
608	*TELvision Laboratories, Inc., Wauconda, Ill.
610	Carter Parts Company, Chicago 10, Ill.
613	*Star Products Company, Chicago 16, Ill.
614	Simpson Electric Company, Chicago 44, Ill.
616	*Illinois Condenser Company, Chicago 22, Ill.
617	RAM Electronics, Inc., Irvington-On-Hudson, N. Y.
618	*TV Products Division, Union Electric & Mfg. Co., Jersey City 7, N. J.
620	Kay Electric Company, Pine Brook, N. J.
621	*Polan Industries, Inc., Huntington 19, W. Va.
624	Surprenant Mfg. Co., Boston 8, Mass.
628	*Davis Electric Company, Cape Girardeau, Mo.
631	*Pickering and Company, Inc., Oceanside, N. Y.
632	*El-Rad Manufacturing Co., Chicago 18, Ill.
633	*American Television, Inc., Chicago 40, Ill.
634	*Todd Products Co., Inc., Mt. Vernon, N. Y.
635	*Todd-Tran Corp., Mt. Vernon, N. Y.
637	*Central Coil Company, Inc., Indianapolis 22, Ind.
638	Industrial Development Engineering Associates, Inc., Indianapolis 26, Ind.
639	Johnson & Hoffman Manufacturing Co., Mineola, N. Y.
642	Mycalex Corporation of America, Clifton, N. J.
643	National Aeronautical Corporation, Ambler, Pa.
644	General Railway Signal Company, Rochester 2, N. Y.
647	Kimble Glass Company, Sub. of Owens-Illinois Glass Co., Toledo 1, Ohio
648	*American Radionic Co., Inc., Danbury, Conn.
649	Electro-Voice, Inc., Buchanan, Michigan
653	Wind Turbine Company, West Chester, Pa.
657	Lowell Manufacturing Company, St. Louis 17, Mo.
658	Sangamo Electric Company, Marion, Ill.
659	John R. Hollingsworth Corporation, Clifton Heights, Pa.
662	Weller Electric Corporation, Easton, Pa.
665	Penn Tran Corporation, Bellefonte, Penna.
668	*Standard Electrical Products Co., Dayton 3, Ohio
670	Glaser-Steers Corporation, Belleville 9, N. J.
671	*Lytle Engineering & Mfg. Co., Chicago 3, Ill.
672	Thomas Electronics, Inc., Passaic, N. J.
674	*Shoup Engineering Company, Chicago 4, Ill.
677	*Rogers Electronic Corp., New York 12, N. Y.
679	*Tech-Master Corporation, New York 13, N. Y.
680	Conrac, Incorporated, Glendora, Calif.
681	*American Lava Corporation. Chattanooga 5, Tenn.
682	*Electrical Windings, Inc., Chicago 39, Ill.
683	Wright Zimmerman, Inc., New Brighton, Minn.
684	*Sarkes Tarzian, Inc., Bloomington, Ind.
686	H. S. Martin & Company, Evanston, Ill.
687	*Hillburn Electronic Products Co., Brooklyn 22, N. Y.
688	*Trad Electronics Corporation, Asbury Park, N. J.
689	*Aladdin Radio Industries, Inc., Nashville 2, Tenn.
692	CELCO (Constantine Engineering Laboratories Co.), Mahwah, N. J.
693	Multi-Tron Laboratory, Chicago 44, Ill.
694	Standard Electronics Corporation, Sub. of Dynamics Corp. of America, Newark 5, N. J.
695	Basler Electric Company, Highland, Ill.
696	The Turner Company, Cedar Rapids, Ia.
697	*Phalo Plastics Corporation, Worcester 8, Mass.
698	Sheffco Mfg. Corp., Palisades Park, N. J.
699	Keystone Electronics Company, Stamford, Conn.
700	*The Radion Corporation, Chicago 14, Ill.
701	Forbes & Wagner, Inc., Silver Creek, N. Y.
703	Prodelin, Inc., Kearny, N. J.
704	Cosmic Radio Corporation, New York 59, N. Y.
705	*Ajax Condenser Co., Inc., Chicago 14, Ill.
706	Pioneer Electronics Corporation, Los Angeles 64, Calif.
707	*Anchor Electronics Inc., Union City, N. J.
708	Bell Sound Systems, Inc., Columbus 7, Ohio
709	*The Rodefer-Gleason Glass Company, Bellaire, Ohio
710	*Standard Condenser Company, Chicago 13, Ill.
711	*Soreng Products Corporation, Schiller Park, Ill.
713	Taylor Tubes, Inc., Chicago 47, Ill.
719	*Carbonneau Industries, Inc., Grand Rapids 2, Mich.
720	Methode Manufacturing Corp., Chicago 47, Ill.
721	*Rollan Electric Co., Chicago 19, Ill.
722	Milwaukee Resistor Co., Milwaukee 4, Wis.
723	*Northwest Plastics, Inc., St. Paul 1, Minn.
724	Jeffers Electronics Division, Speer Carbon Company, Dubois, Penna.
726	Penn Television Products Co., Philadelphia 34, Pa.
730	Jersey Specialty Co., Inc., Mountainview, N. J.
732	Radio Materials Corporation, Chicago 13, Ill.
733	Alpha Metals, Inc., Jersey City 4, N. J.
734	Fretco Incorporated, Pittsburgh 13, Penna.
736	*Paul & Beekman, Inc., Philadelphia 40, Pa.
737	*Technical Appliance Corp., Sherburne, N. Y.
738	Lewis and Kaufman, Ltd., Los Gatos, Calif.
739	Oak Electronics Company, Buffalo 3, N. Y.
740	Olympic Metal Products Co., Inc., Alpha 1, N. J.
742	*Esquire Radio Corporation, Brooklyn 19, N. Y.
744	Hughes Aircraft Company, Culver City, Calif.
745	*Tempel Manufacturing Company, Chicago 26, Ill.
746	*L. H. Frost & Co., Inc., Grand Rapids 8, Mich.
748	*Russell Speaker Company, Chicago 29, Ill.
749	*National Electronics, Incorporated, Geneva, Ill.
750	Mosley Electronics, Incorporated, St. Louis 14, Mo.
752	Electronic Devices, Inc., Brooklyn 15, N. Y.
756	Universal Company, High Point, N. C.
757	*Grand Transformers, Inc., Grand Haven, Mich.
760	*Co-Operative Industries, Inc., Chester, N. J.
761	*Planet Manufacturing Corp., Bloomfield, N. J.
762	Erca Tool Die & Stamping Co., Brooklyn 22, N. Y.
767	Quincy Speaker Manufacturing Corp., Quincy, Ill.
768	Microtran Company Division, Crest Laboratories, Inc., Rockaway Beach 93, N. Y.
769	National Electric Products Corp., Pittsburgh 22, Penna.
770	Stone City Machine & Tool Co., Bedford, Ind.
771	Penta Laboratories, Inc., Santa Barbara, Calif.
772	*Muntz TV, Inc., Chicago 13, Ill.
773	*The Forest Electric Company, Forest Park, Ill.
775	*Electro-Mechanical Products Corp., Riverhead, N. Y.
776	*Ogden Coil & Transformer Co., Chicago 12, Ill.
780	DeJur-Amsco Corporation, Long Island City, N. Y.
781	Vacuum Tube Products Co., Inc., Oceanside, Calif.
782	Spencer Kennedy Laboratories, Inc., Boston 35, Mass.
783	Eldico of New York, Inc., Mineola, Long Island, N. Y.
784	Johnson Electronics Inc., Orlando, Fla.
785	*Worthco Corporation, Beverly Hills, Calif.
786	*Hinners-Galanek Radio Corp., Cavalier Radio & Television Div., Long Island City 6, N. Y.
787	*Sonotone Corporation, Elmsford, N. Y.
789	McGregor Electronic Industries, Inc., McGregor, Ia.
791	*Hopkins Engineering Company, Altadena 3, Calif.
792	Atlantic Wire & Cable Company, College Point 56, N. Y.
793	McIntosh Laboratory, Inc., Binghamton, N. Y.
794	Harman-Kardon, Inc., Westbury, Long Island, N. Y.
795	G & H Wood Products Company, Brooklyn 11, N. Y.
796	*Richmond Radionics Corp., Delavan, Wis.
797	Vidaire Electronics Mfg. Co., Lynbrook, L. I.
798	*Supreme Transformer Corporation, Chicago 39, Ill.
799	*California Magnetic Control Corp., North Hollywood, Calif.
802	Tempo T. V. Mfg. Corp., Canoga Park, Calif.
803	Microwave Associates, Inc., Boston 15, Mass.
804	*Union Electric & Manufacturing Company, Jersey City 7, N. J.
806	*Mark Electronics Inc., Newark 2, N. J.
808	*Henald Manufacturing Co., Piper City, Ill.
809	Varian Associates, Palo Alto, Calif.
810	Translite Electronics Corp., Chicago 39, Ill.
811	Continental Electronics Corp., Philadelphia 31, Penna.
812	*Bradley Laboratories, Inc., New Haven 11, Conn.
813	Adler Electronics Inc., New Rochelle, N. Y.
815	San Fernando Electric Mfg. Co., San Fernando, Calif.
816	Dale Products, Inc., Columbus, Nebr.
817	Brubaker Electronics, Inc., Los Angeles 34, Calif.
818	*Tel-O-Tube Corporation of America, East Paterson, N. J.

Code No.	Company
819	Z & W Machine Products Inc., Wickliffe, Ohio
820	*United Electronic Manufacturing Corp., Union City, N. J
822	*Syntronic Instruments, Inc., Addison, Ill.
824	*Videocraft Manufacturing Co., Chicago 39, Ill.
825	*Thermador Electrical Mfg. Co., Los Angeles 22, Calif.
828	Midland Manufacturing Co., Inc., Kansas City 15, Kan.
830	*Triad Transformer Corporation, Venice, Calif.
831	*Better Coil & Transformer Corp., Goodland, Ind.
832	McCoy Electronics Co., Mt. Holly Springs, Penna.
834	*Mel-Rain Corporation, Indianapolis 4, Ind.
835	*Ratel, Inc., Goleta, Calif.
836	*National Video Corporation, Chicago 32, Ill.
837	*Carol Electronics Corporation, Martinsburg, W. Va.
838	*Carson Manufacturing Company, Indianapolis 18, Ind.
840	Orradio Industries, Inc., Opelika, Ala.
841	Central Sales & Manufacturing Corp., Denville, N. J.
842	The Tetrad Company, Yonkers 2, N. Y.
844	Rectifier Corporation, Fajardo, Puerto Rico
845	International Rectifier Corporation, El Segundo, Calif.
847	University Loudspeakers, Inc., White Plains, N. Y.
848	Onondaga Pottery Company, Electronics Division, Syracuse 1, N. Y.
850	Chromatic Television Laboratories, Inc., New York 36, N. Y.
851	R. L. Drake Company, Miamisburg, Ohio
852	Andrew's Tower, Inc., Fort Worth 11, Tex.
855	International Instruments Inc., New Haven 15, Conn.
856	Clevite Transistor Products, Division of Clevite Corporation, Waltham 54, Mass.
857	*V-M Corporation, Benton Harbor, Mich.
859	U M & F Manufacturing Corporation, North Hollywood, Calif.
860	Avionex Electronics Corporation, Burbank, Calif.
861	Goodline Corporation, Alhambra, Calif.
862	Cal-Tronics Corporation, Los Angeles 45, Calif.
863	*James Vibrapowr Company, Chicago 18, Ill.
864	*Tele-Ray Tube Co., Inc., Yonkers, N. Y.
865	Davis Electronics Co., Burbank, Calif.
868	*Industrial Hardware Manufacturing Co., Inc., New York 12, N. Y.
867	C-B-C Electronics Co., Inc., Philadelphia 33, Pa.
868	Telechrome Incorporated, Amityville, N. Y.
869	Kline Iron and Metal Company, Columbia, S. C.
870	Cubic Corporation, San Diego 6, Calif.
871	Precision Electronics Inc., Franklin Park, Ill.
872	S & A Electronics, Toledo 5, Ohio
874	Tristao Manufacturing Co., Tulare, Calif.
876	Phen-O-Tron, Inc., New Rochelle, N. Y.
877	Hydro-Aire, Inc., Sub. of Crane Co., Burbank, Calif.
878	Acro Products Company, Philadelphia 28, Penna.
879	Litton Industries, Beverly Hills, Calif.
882	Plamondon Magnetics Company, Chicago 22, Ill.
884	*C R T Electronics Corp., Mt. Vernon, N. Y.
885	Condenser Manufacturers, Inc., Nashville 5, Tenn.
886	Calvideo Tube Corporation, Los Angeles 45, Calif.
887	International Telemeter Corporation, Los Angeles 25, Calif.
888	Connector Corporation, Chicago 30, Ill.
889	*Polyphase Engineering, Chicago 22, Ill.
890	Wire Company of America, Santa Barbara, Calif.
891	Southern Electronics Company, Greeneville, Tenn.
892	*American Transformer Corp., Chicago 7, Ill.
893	Armel Electronics Inc., Brooklyn 32, N. Y.
894	Hy-Gain Television Products, Lincoln, Nebr.
895	*Dinion Coil Co., Inc., Caledonia, N. Y.
896	Viking Electric, Div. of Viking Industries, Inc., Canoga Park, Calif.
897	Tresco (Transformer and Electronic Specialties Co.), Philadelphia 28, Penna.
898	CONVAIR, Division of General Dynamics Corp., Pomona, Calif.
900	ACF Electronics, Division of ACF Industries, Inc., Alexandria, Va.
901	Cargo Packers Inc., Brooklyn 18, N. Y.
902	Elgin Metalformers Corporation, Elgin, Ill.
903	D & M Products, Detroit 35, Mich.
904	Pan-Electronics Corporation, Griffin, Ga.
905	Allied Research & Engineering Div., Allied Record Manufacturing Co., Hollywood 38, Calif.
906	*Coilcraft, Incorporated, Cary, Ill.
908	*Aerocoil, Inc., Jersey City, N. J.
909	*Chester Cable Corp., Chester, N. Y.
910	*Aerolite Electronics Corp., Union City, N. J.
911	International Electronics Industries, Inc., Nashville 1, Tenn.
912	*Blackburn Electronic Corporation, Wyoming, Pa.
913	General Products Corporation, Union Springs, N. Y.
914	*Centran, Inc., Div. of Central Coil, Greensburg, Ind.
915	*Rollins Corporation, Lewes, Del.
916	Texas Electronics Mfg. Co., Inc., Houston, Tex.

Code No.	Company
917	Resitron Laboratories, Inc., Los Angeles 25, Calif.
918	*Oaktron Industries Inc., Monroe, Wis.
919	Richardson Company, Hollywood 28, Calif.
920	The Antenna Specialists Co., Cleveland 6, Ohio
921	Technical Training Institute, Portland 11, Ore.
922	Standard Television Tube Corp., New Orleans 12, La.
923	Jerrold Electronics Corporation, Philadelphia 3, Pa.
924	Germanium Products Corporation, Sub. of Radio Development & Research Corp., Jersey City 4, N. J.
925	Kay Lab, San Diego 12, Calif.
926	*Todd Electric Company, Inc., Yonkers, N. Y.
927	General Mills, Inc., Mechanical Division, Minneapolis 13, Minn.
928	*Acme Coil & Transformer Corp., Chicago 14, Ill.
929	Parker Metal Goods Company, Worcester, Mass.
930	Raytronic Laboratories, Inc., Cincinnati 15, Ohio
931	Skiatron Electronics & TV Corp., New York 3, N. Y.
933	*Magnetic Coil Manufacturing Company, Chicago 22, Ill.
934	*Oaktron Electric Company, Tinley Park, Ill.
935	*Electrons, Incorporated, Newark 3, N. J.
936	*Hamilton-Hall Mfg. Company, Milwaukee 2, Wis.
938	Farnsworth Electronics Company, Fort Wayne, Ind.
940	Bomac Laboratories, Inc., Beverly, Mass.
941	Electronic Engineering Company of California, Los Angeles 57, Calif.
942	Federated Metals Division, American Smelting and Refining Co., New York 5, N. Y.
943	G. M. Giannini & Co., Inc., Pasadena 1, Calif.
944	Insulated Circuits, Inc., West Caldwell, N. J.
945	*The J & G Machine Co., Inc., Worcester 4, Mass.
946	Mechanical Steel Tubing Corp., Bronx 59, N. Y.
947	Pacific Semiconductors, Inc., Culver City, Calif.
948	The Radix Wire Company, Euclid 32, Ohio
949	*Apex Coil and Transformer Corporation, Chicago 8, Ill.
950	Feedback Controls, Inc., Alexandria, Va.
951	Kost Products Company, Inc., Chicago 39, Ill.
952	Rhein Sound Systems, Inc., Marion, Ill.
953	Scientific Radio Products, Inc., Omaha 8, Nebr.
954	Union City Filament Corp., Union City, N. J.
955	United States Electronic Research & Development Corp., Detroit 16, Mich.
956	Vitramon, Inc., Bridgeport 1, Conn.
957	Winston Electronics, Inc., Philadelphia 27, Pa.
958	Five Star Manufacturing Company, Houston 20, Tex.
959	*Transitron Electronic Corporation, Melrose, Mass.
960	*Ontario Industries, Inc., Hornell, N. Y.
961	Anton Electronic Laboratories, Inc., Brooklyn 37, N. Y.
962	Televideo Corporation of America, Los Angeles 12, Calif.
963	Foto-Video Laboratories, Inc., Bloomfield, N. J.
964	Huggins Laboratories, Inc., Menlo Park, Calif.
965	Moloney Electric Company, St. Louis 20, Mo.
966	Mullenbach Division of Electric Machinery Mfg. Co., Los Angeles 58, Calif.
967	North American Aviation, Inc., Downey, Calif.
968	Rapid Die and Molding Co., Schiller Park, Ill.
969	Reeves-Hoffman Corporation, Carlisle, Pa.
970	TelAutograph Corporation, Los Angeles 19, Calif.
971	Vector Electronic Company, Los Angeles 65, Calif.
972	*Industrial Tubes, Inc., Geneva, Ill.
973	*PCA Electronics Inc., Santa Monica, Calif.
974	*Lectrohm, Inc., Chicago 30, Ill.
975	*Sherold Crystals Inc., Kansas City 8, Mo.
976	*Model Engineering & Manufacturing, Inc., Chicago 18, Ill.
977	*Filtors, Inc., Port Washington, L. I., N. Y.
978	American Electronics Company, New York 59, N. Y.
979	Ratigan Electronics Inc., Los Angeles 11, Calif.
980	Texas Instruments Incorporated, Dallas 9, Tex.
981	Vega Electronics Corporation, West Los Angeles 25, Calif.
982	*Precision Coil Manufacturing Company, Santa Monica, Calif.
983	*Gonset Company, Inc., Burbank, Calif.
984	*Electro-Winders Co., El Monte, Calif.
985	*Electronic Circuits, Inc., Glenview, Ill.
986	*Delevan Electronics Corporation, East Aurora, N. Y.
987	*Florida-Merit Inc., Hollywood, Fla.
988	Tansitor Electronics, Inc., Bennington, Vt.
989	*Marvel Electric Corporation, Chicago 22, Ill.
990	General Transistor Corporation, Jamaica 35, N. Y.
991	Benson-Lehner Corporation, West Los Angeles 64, Calif.
992	Grayhill, La Grange, Ill.
993	Midwest Speaker Company, McGregor, Iowa
994	Eberline Instrument Division, Reynolds Electrical and Engineering Co., Santa Fe, New Mexico
995	Standard Crystal Company, Kansas City 8, Mo.
996	*Grand Ra-Tronics, Inc., Lab. of Grand Transformers, Inc., Grand Haven, Mich.
997	United States Dynamics Corporation, Boston 20, Mass.

The PHOTOFACT Servicer

June 15, 1950 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ Vol. 10, Nos. 97 & 98

BOUQUETS! WE TAKE A DEEP BOW AND SAY A GRATEFUL "THANKS."

From Fred Shunaman,
Managing Editor,
Radio Electronics:

"Your new service is bound to be extremely interesting to service technicians, many of whom have been squawking that, while it is not always easy to get television sets, they can usually be obtained long before any service data on them is available."

* * *

From Raymond W. Andrews,
Merchandising Manager,
Sylvania Electric Products, Inc.,
Emporium, Penn.:

"I've received a copy of the Photofact Folder Set No. 91 and free supplement No. 91A. This represents real value to the TV serviceman. I honestly don't know how you can do it. It must have cost a fortune, but should prove highly effective. Technically, it is the usual fine work which your team puts out."

* * *

From Orestes H. Caldwell,
Editorial Director,
Radio & Television Retailing,
New York, N. Y.

"Congratulating you on your timely service to TV."

* * *

From Paul E. Holmstrom,
2014 Burnet Avenue,
Cincinnati, Ohio:

"I just received my SAMS Folders No. 90 and 91 in the mail today and I wish to make this response in enthusiasm to your new program of furnishing circuit diagrams that will carry us over the gap until the complete SAMS Folders can be prepared. These circuit diagrams can in no way replace the excellent service aids of the standard Photofact Folders, but will go far in alleviating the aggravation of circuit tracing through wiring harnesses.

"I am sure that my thanks is only a small part of the appreciation that will be felt by all television servicemen in general, and so far all of us, may I say, 'Thanks for keeping us informed and up to the minute.' "

* * *

From Will Morgan,
Morgan's Electronic Service,
Marshalltown, Iowa:

"Just a short letter to express our appreciation of your service to us. A few days ago we had dire need of a schematic not covered in your regular Photofacts. Within less than five days you had supplied us - and at no charge. (Both the time and the no charge were unbelievable.) Then today we received our latest Photofacts and found included FREE TV dope sheets - and on one particular model on which we had sweat blood and written countless letters to the manufacturer. Your organization should take great pride in the services you are performing for us.

"We can deeply appreciate your service since we are servicing up-to-date, in-warranty sets for five of the local stores. It is quite important to us that we keep our service techniques up to date because these five stores represent nearly all the larger stores in our locality and the competition is keen. Your organization is going a long way toward keeping us on the ball and we know a portion of our success is due to your service. Thanks a million!"

* * *

From Martin H. Riggs,
29-31 Hillside Avenue,
Bristol, Connecticut:

"Just a word of appreciation in regard to the Bonus TV. This is the answer for a great many of us. I have everything you have printed and am well pleased with it."

From Marcus H. Moses,
35 Hamilton Place,
New York 31, New York:

"Just received Sets Nos. 91 and 92 and hasten to congratulate you on 91A. This is really something."

* * *

From H. G. Baker,
Vice President and General Manager,
Home Instrument Department,
Radio Corporation of America,
Camden 2, New Jersey:

"Thank you for the sample copies of Photofact Folders and the Bonus Supplement Set covering additional television receivers.

"Our organization is fully aware of the excellent service you are providing the Servicing Fraternity and wish you success in continuing this service and even expanding it to whatever extent practical.

"We are very conscious of the need for a complete, accurate and fast information of any manufacturer's product and, as you are well aware, our own Service Company has been particularly successful in distributing through our normal channels very excellent information.

"Our Engineers and Service personnel advise me that they have been familiar with your service since its inception and have cooperated with you to the extent possible, which I am sure they will continue to do."

* * *

From P. J. McCray,
Arlington Radio Laboratories,
The Arlington Radio Building,
Arlington, Virginia:

"The Bonus Set is the best news yet. Keep it up."

* * *

From R. H. Dohmen,
Dohmen Radio Service,
New Prague, Minn.:

"Just received your 91A Folder. This is the best idea that you have come up with. It will help with TV work immensely. Will be looking forward to 93A."

From Gordon H. Good,
Elmwood Music Shop,
480 Elmwood Avenue,
Buffalo, New York:

"Your Supplement No. 91A is exactly what we need until the complete Folders are ready. As long as you are producing the goods as fast as is humanly possible, that's as much as could be expected from anybody."

INTERESTING NOTE

During the period April 10th to May 10th - manufacturers introduced 90 new TV models and 38 new Radio models.

FIELD EXPERIENCES -

For every service "Field Experience" published, we issue a certificate good for one PHOTOFACT Folder Set. Awards are issued at the time of publication. Since it is impossible to verify the accuracy of contributions, we cannot be responsible for either the diagnosis made of the receiver trouble, or for the results obtained by following the suggested repair routine. All contributions become the property of Howard W. Sams & Co., Inc.

* * *

BREAKS IN THE LEAD-IN OF A CONICAL TYPE ANTENNA

We have been faced with the problem of whether any breaks have occured in the lead-in of a television antenna of the conical type. Folded dipole types which make complete continuity can easily be checked with an Ohmmeter. This problem with conicals or straight dipoles we have solved with the addition of a 100,000 resistor which was first coated with coil dope across the terminal strip at the antenna.

This resistor obviously does not affect either the signal or the impedance match of the system because of its high resistance compared to a 300 or 72 Ohm line.

Whenever there is doubt about the lead-in, all that is necessary is to remove the connections at the TV set and measure the resistance at that point, which should of course be 100,000 Ohms.

Robert Spangler
Spangler's Radio & Sound Service
Marietta, Penn.

CRAFTSMEN Model RC100 TV

Complaint: No raster.

Remedy: Check 10 K Ohm resistor (plate) feeding 12AU7, horizontal discharge tube. If found open, replace 10 K Ohm resistor and .1 MFD. 600 volt capacitor at this point.

B. A. Neal Radio & Television
12 West Wellsboro Street
Mansfield, Pennsylvania

* * *

CLARION Model C108
Photofact Set No. 5, Folder No. 8

Trouble: Set squealed when placed in cabinet.

Remedy: This was corrected by dressing the leads to the speaker away from the grid cap of the 1H5 tube.

Ben's Radio Shop
Davis, Okla.

* * *

CORONADO Model 94TV6-43-8953A

Complaint: Heavy intercarrier buzz accompanied with tearing of picture at both high and low settings of picture (contrast) control.

Cause: 10 MMF. and/or 100 MMF. ceramic capacitors mounted on 6BG6B socket shorted or leaking.

Remedy: Replace these capacitors with good units.

RAYTHEON Model M-1106

Complaint: No raster. Sound Normal. Removing 1X2 tube made 6BG6G output tube operate normally and high voltage was available on lead which goes to 1X2 capacitor. With 1X2 in circuit, 1X2 would flash internally and sparks would fly out of filament. No high voltage arc could be had from either 6BG6G or 1X2 capacitors.

Cause: One turn of high voltage wire is wound around core of flyback transformer and connected to 1X2 for filament supply. High voltage had broken down the insulation on this wire and the spaghetti around it, charring and causing an intermittent low resistance to ground. An Ohm-meter showed this.

Remedy: Replace this turn of wire with special high voltage cable. I used a piece of small outside diameter auto ignition cable and new spaghetti for mechanical protection. Compare the brilliance of the 1X2 filament, after repairs, with that of a properly operating set or with a 1X2 with exactly 1.25 volts on filament, to be sure 1X2 is operating with limits.

Editor's Note: Both above Field Experiences were submitted by:

John R. Crane
Crane Radio and Television Service
Excelsior, Minnesota

* * *

ZENITH Model G2441-R, Chassis 24622/23

Complaint: 25Z6GT and 12AU7 burn out because of excessively heated filaments. Either one of these may burn out separately, or another tube in filament string may burn out.

Remedy: One or two of the 6AU6 IF amplifiers may be internally shorted making low voltage drop across others. In this particular case, the filament voltages on the 25Z6 and 12AU7 were high, next 6AU6 in string was slightly low, and the other 6AU6's were excessively low.

ZENITH Model G2340-Z, Chassis 23G24

Trouble: When 6BN6 audio detector is replaced, a loud noise is noticed between channels, on vacant channels and on weak stations.

Remedy: Bias control in cathode of 6BN6 must be adjusted for quiet sound much the same as adjustment on standard FM ratio detector.

Editor's Note: Both above experiences were submitted by:

Myron B. Maddex, Serviceman
R. W. Schetter
7 North Main Street
Mechanicsburg, Ohio

* * *

WE'LL PAY $5.00 FOR YOUR IDEAS
ON NEW WAYS TO USE
PHOTOFACT FOLDERS

Have you found some novel way of putting your PHOTOFACT Folders to work so you get extra value and help from them? Tell us about it, and if the idea is good enough to pass on to thousands of your fellow PHOTOFACT subscribers, we'll print it in the "Servicer" and send you a crisp $5.00 check. We are going

"Hog Wild" this time by awarding six crisp $5.00 checks. Here they are:

"When a fellow who is interested in the makeup of a set, or wants to know what the 'insides' look like and wants to buy a new set, I go to the PHOTOFACT Folders. Here he gets a very good picture of what the set looks like and the exact number of tubes and the general layout. This idea of showing this information to hard to sell customers has, I can truthfully say, sold more sets for me. Here I can show them how easy it will be to repair this set, if they buy it. In other words, it helps me to sell my service before it is needed. This especially holds true for Television Sets."

R. H. Dohmen
Dohmen Radio Service
New Prague, Minn.

* * *

"Your reprints, like: 'Is Color TV ready for the home?' are very useful and when customers start to ask me questions that I have no time to answer, I show them the pamphlets where I have marked in red some of the important things, and the customer is always happy that way, and I am too because it saves me time."

Paul Boller
Boller's Television
& Radio Service
311 W. Main Street
Springfield, Ohio

* * *

"At our shop we have five or six men working and I have found that by separating the PHOTOFACT Folders into the following groups prevents one person from tying up a full volume for one job when it can be used by several if they happen to be working on separate jobs. Such as one on house sets, one on car sets and myself on public address amplifiers.

"I separate the PHOTOFACT Folders as they come in and place the information in numerical order in the various folders. We use separate columes, thus:

Car Sets
Inter-Coms
Public Address Amplifiers
Record Changers
TV
Wire and tape recorders
Special:

Convertors
Aircraft transmitters and receivers

Ray Stephens
715 N. Third Street
Clear Lake, Iowa

* * *

Then these three all had the same idea - so we are triple-prizing them - and giving them a break:

"When we receive a PHOTOFACT Folder Set with a PHOTOFACT Servicer, the information contained in the Servicer on different sets is immediately noted on the original PHOTOFACT Folder covering that particular receiver, in this manner:

'See also Photofact Servicer
Photofact Folder Set No. _____'

"The above is a rubber stamp we had made and it keeps the appearance of our PHOTOFACTS neat and speeds up our servicing."

Donat A. Duquet
Radio & Electrical
Appliance Service
10 Monument Street
Waterville, Maine

* * *

The same idea was submitted by:

Joe M. Petro
Petro's Radio & TV Service
207 Hardy Street
Hattiesburg, Miss.

who also suggested that if you wished, you could cut out from the Servicer the Field Experience and attach to the Folder on this Model.

Also by:

Augustus W. Benedict
R. D. 2
Rome, N. York

* * *

Address your letters to Mrs. Ann Jones, c/o Photofact Servicer.

The PHOTOFACT Servicer

Vol. 23, Nos. 225 & 226 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ November 15, 1953

BOOK REVIEW

Television Fundamentals, Theory,
Circuits and Servicing
by Kenneth Fowler and Harold B. Lippert

McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York 36, New York
524 pages - $7.00

The authors, both widely known for their activities in the Electronics Division of the General Electric Co., have presented the basic principles of TV servicing and installation.

The book describes, in detail, each of the elements of the TV receiver, from antenna to picture tube, and includes practical installation procedures. One chapter is devoted to test equipment and alignment techniques and another to detailed, illustrated service hints and trouble shooting by picture analysis.

The treatment is sound and theoretical without the use of complex mathematical analyses. The radio technician who wishes to move on to television will find this text helpful in his studies.

FACTORY SERVICE HINTS

The following service hints are brought to you through the courtesy of Admiral Corporation, "Radio and Television Service Bulletin".

Chassis 19B1, 19C1, 19F1,
A, 19H1, 19K1
Photofact Set 210, Folder 2
Chassis 19E1, 19G1, 19N1
Photofact Set 203, Folder 2
Chassis 22C2, 22E2
Photofact Set 201, Folder 2
Chassis 23A1
Photofact Set 211, Folder 2

These chassis now use a 3/8 amp fuse (Part #84A4-3) for M1 instead of a 1/4 amp fuse. The large fuse reduces the chance of failure due to line voltage surges. This change has Underwriter's Approval. Use 3/8 ampere fuses for all replacements in these models.

Chassis 19B1, 19C1, 19F1,
A, 19H1, 19K1
Photofact Set 210, Folder 2
Chassis 19E1, 19G1, 19N1
Photofact Set 203, Folder 2

It may be found that some 19 series chassis with a 10 inch electromagnetic speaker have an objectionable residual hum level. Lead dress in the audio input circuits should be checked first, with particular attention paid to the AC leads to the on-off switch. These leads should be well away from the audio amplifier grid circuit. The audio coupling capacitor (C41 or C42) should be dressed away from the on-off switch. In models with tone control, dress the lead between the control and the audio amplifier plate away from the AC leads. Also check the filter capacitors (especially C1). If none of these are the source of hum, the speaker is probably at fault. This can be verified by substituting a PM speaker with choke attached (#78B80-1).

This condition may occur in early production 19 series chassis if the red lead to the horizontal deflection yoke is too near the grid circuit of the vertical output tube (V13, 6S4). This lead should be dressed against the chassis well away from the grid circuit.

Horizontal Instability In 19 Series Chassis-

An 8200Ω resistor (Part #60B8-822) (Item R62 in Photofact Set 210, Folder 2) has been added in series with (R67A or R63A), the 22,000Ω resistor included in the vertical integrator couplate (part #63B6-2). This change increases the horizontal sync level and "squares up" the horizontal sync pulse. This is the Run 4 change.

To install this resistor, remove the #3 lead of the couplate from Pin 1 of V12 (12AU7, sync clipper) and connect the 8200Ω resistor between the number three lead and Pin 1.

19 Series Horizontal Oscillator
Components Change-

In cases where it is difficult to obtain satisfactory adjustment of the horizontal lock-in range and horizontal frequency on this chassis, the following components in the horizontal oscillator circuit (V14, 6SN7) should be checked for correct value as described below.

Symbol No. PFF203-2	Symbol No. PFF210-2	Value		New Part No.
C62	C61	.01MFD	10%	64A2-16
R80	R75	330KΩ	5%	60B7-334
R79	R74	82KΩ	5%	60B7-823
R83	R77	150KΩ	5%	60B7-154

Production now specifies these tolerances. Part numbers for the new components are shown above.

Horizontal Stability Improved In
19 Series Chassis - Run 7-

The horizontal stability of the 19 series chassis has been improved with the use of a new vertical sync

integrator couplate, 63B6-11. The circuit of this couplate is the same as the 63B6-2.couplate used in chassis stamped RUN 6 or lower, except that resistor (R67A or R63A) (22,000Ω) is not contained in this new couplate. Instead, resistor (R76A or R63A) is connected externally from terminal 3 of the couplate to pin 1 of V12. This change in integrator couplates has improved the horizontal sync stability by increasing the amplitude and "squaring up" the horizontal sync pulses.

This change represents a further improvement over that obtained with the RUN 4 production change, which consisted of adding a 8200Ω resistor between terminal 3 of the couplate and pin 1 of V12. The use of the new couplate cancels the RUN 4 change.

To replace the old couplate, 63B6-2, with the new improved couplate, 63B6-11, omit the 8200Ω resistor added at RUN 4. Chassis stamped RUN 3 or lower will not have this resistor. Connect a 22,000Ω 1/2W resistor, 60B8-223, between terminal 3 of the new couplate and pin 1 of V12.

New Sync "Take-Off" Couplate - Run 7-

At RUN 7, a new sync couplate, 63B6-8, replaces the old sync couplate 63B6-4. It is not necessary to incorporate this change in the field.

Chassis 22C2, 22E2
Photofact Set 201, Folder 2

"Ringing" In 22C2 and 22E2 Chassis-

"Ringing" in 22C2 and 22E2 chassis, consisting of at least four tunable "ghosts", about a half inch apart, may be caused by the fourth IF transformer L15, being wired in backwards; i.e., the primary and secondary reversed, with the secondary coil winding between terminals 2 and 3 connected in the plate circuit of V5, and the primary coil winding between terminals 1 and 4 connected in the cathode circuit of V6.

The numbered terminals on the bottom of the transformer should be connected as follows: terminal number 1 to the red B+ wire going to the screen of the third IF tube pin 6 of V5 6AG5; terminal number 2 to the cathode of the video detector tube pin 3 of V6 12AT7; terminal number 3 to chassis ground; terminal number 4 to the plate of the third IF tube pin 5 of V5 6AG5.

60 Cycle Hum In 22 Series Chassis-

A cathode to heater short in the limiter tube, V9, in the 22 series chassis will cause a loud 60 cycle hum when there is a signal being received. If hum is encountered in a 22 series chassis, disconnect the antenna and if the hum level decreases, it is likely that V9, 6AU6, may be defective.

Chassis 22A2, 22A2A, 22M1, 22Y1
Photofact Set 180, Folder 2
Chassis 22C2, 22E2
Photofact Set 201, Folder 2

Horizontal Ripple-

Horizontal ripple, moving up or down in the picture, is usually due to a power source frequency difference between the transmitter and the television receiver. It is caused by some of the sixty cycle power source voltage feeding into the horizontal oscillator. This AC voltage can come from the "B" plus supply, through the horizontal sync discriminator, and thus be applied to the control grid of the oscillator, or from flux leakage around the power transformer.

The most common cause of horizontal ripple in the 22 series chassis is flux leakage around the power transformer (even though it has a copper band) to the horizontal lock coil.

The power transformer on the 22F2, 22P2 and 22M2 is mounted at a different position on the chassis and modification may or may not be necessary.

To shield the horizontal lock coil from the power transformer use the following step by step procedure:

1. Disconnect the red lead from the lug on the horizontal lock coil and reroute it away from all chassis components. Reconnect the red lead to the lock coil lug. See Figure 1.

2. Replace the 5600Ω resistor, which is connected between the lug of the lock coil and pin 2 of V17 (6SN7), with a new 5600Ω, 1/2 W resistor having longer leads or splice a wire to one lead of the existing 5600Ω resistor in order to lengthen it. Cover the resistor leads with spaghetti.

3. Remove the horizontal lock coil from the rear chassis apron by placing the fingers on the end of the coil from nearest the rear of the chassis and pulling the coil toward the front of the chassis. This leaves the slug and part of the assembly still attached to the chassis.

4. Procure a metal shield can, preferably an IF can that is not made of aluminum. Test to see that the can will take solder before installing

5. Slip the shield can over the slug, as shown in Figure 1. The hole through the top of the can should be 7/16 inch diameter or larger.

6. Insert the lock coil through the shield can, over the slug, and back into its original assembly.

7. Solder the shield can to the mounting bracket of the assembly. Be sure to clean and tin thoroughly the surfaces to be soldered to insure a good electrical connection.

8. Check operation of the receiver and readjust the horizontal lock slug if necessary.

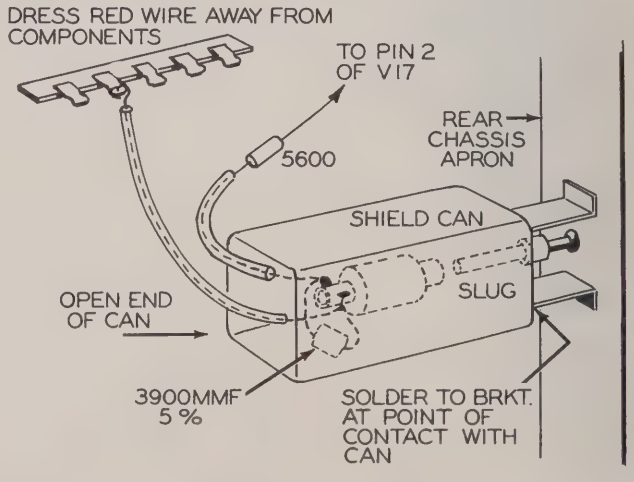


Figure 1

The PHOTOFACT Servicer

Vol. 25, Nos. 239 & 240 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ March 1, 1954

NEW PARTICIPANT

We are pleased to announce that Permo, Inc., phono needles will be listed in Photofact Folders starting with Photofact Set 241.

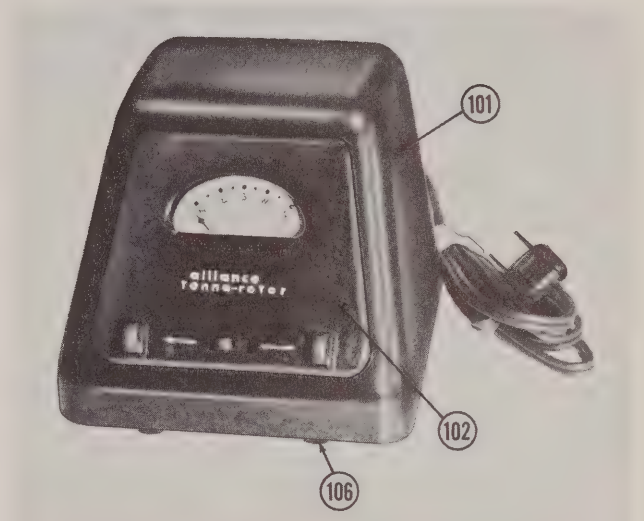
CRYSTAL DIODES

Crystal Diode replacements of Federal Telephone & Radio Corp., and Sylvania Electric Products, Inc., are now being listed in Photofact Folders.

ALLIANCE TENNA-ROTOR

Model DIR

The following information on the Alliance Tenna-Rotor Model DIR is presented through the courtesy of Alliance Manufacturing Co., Alliance, Ohio.



GENERAL INFORMATION

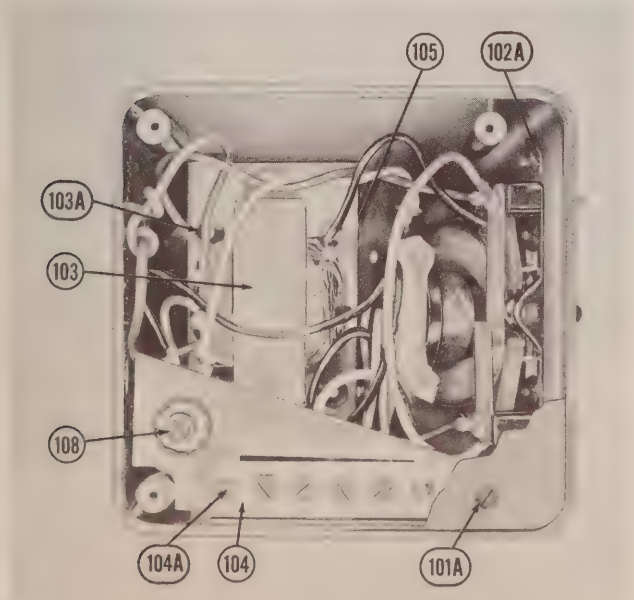
The Alliance Tenna-Rotor, Model DIR, is actuated by moving the switch lever on the control box to the left or right; right rotates the antenna clockwise and left rotates the antenna counter-clockwise. The antenna direction is registered by an indicator located on the control box panel. This indicator is actually a voltmeter which measures the voltage across a potentiometer mounted in the rotator unit. Rotating the antenna varies the voltage across the potentiometer causing the meter to register.

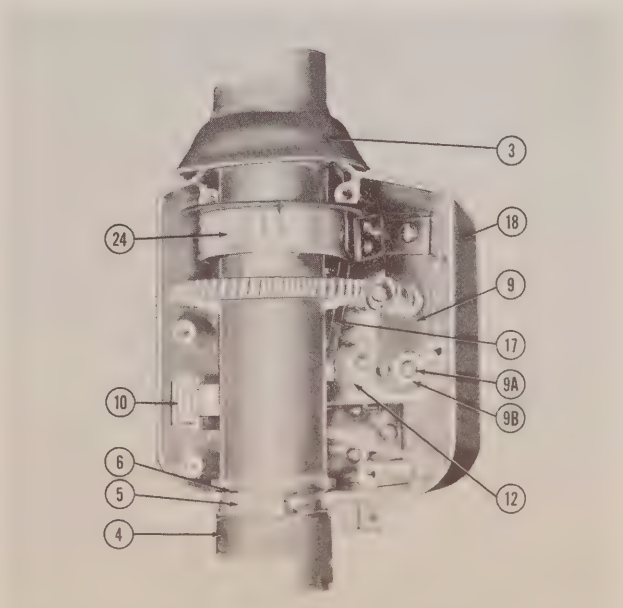
SERVICING PROCEDURE

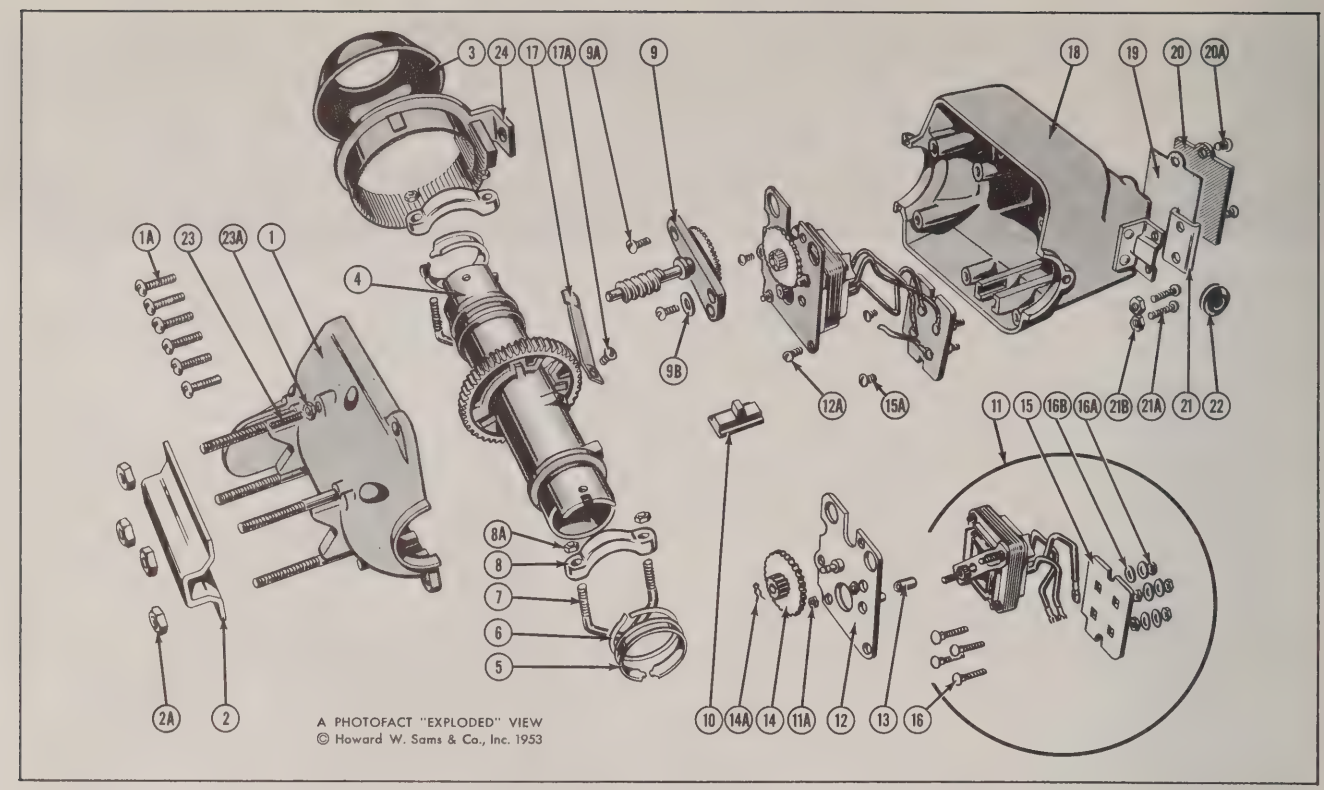
Power-off Checks

1. Be sure that four-conductor cable is connected to proper terminals. Terminal No. 1 in the rotator should be connected to Terminal No. 1 on the control box and so on with No's. 2, 3, and 4.

2. Set-screw (Item #23) must be backed off from finger tight position 1/4 to 1/2 turn, and nut (Item #23A) tightened.







3. Hollow shaft (Item #4) must have "play".

4. Primary input contacts within the control box, should be .020 inch apart, and make solid contact for left and right positions.

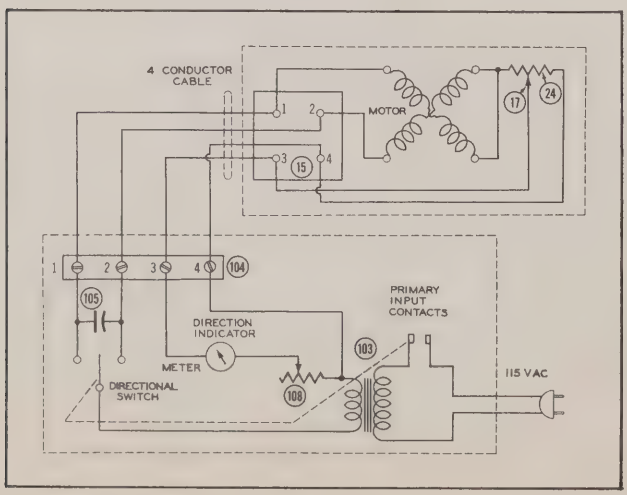
Power-on Checks

1. Line voltage should be approximately 115 volts.

2. Run unit to counter-clockwise stop by moving control box lever to the left. Indicator pointer should decrease steadily, stopping at the left side of the dial when the rotator reaches the counter-clockwise stop.

3. Run unit to clockwise stop by moving lever to the right. Indicator pointer should increase steadily, stopping at the extreme right end of the dial when the rotator reaches the clockwise stop.

4. Adjust calibrating rheostat (Item #108) for full-scale north reading when unit is at full clockwise stop.



ITEM	NAME	PART NO.
	Rotator Assembly	Z-3957-S
1	Housing Assembly, RH	Y-3383-R
1A	Housing Screws	10-32x3/4
2	Clamping Plate	X-3768-A
2A	Nuts, Hex	1/4 - 20
3	Weather Shield	X-3375-B
4	Shaft Assembly	Y-3378-S
5	Bearing Collar	X-3987-A
6	Thrust Washer	X-3376-A
7	U-Bolt	X-3377-A
8	Mast Clamp	X-3319-A
8A	Nut, Hex	10-32
9	Worm Assembly	Y-3355-R
9A	Screw, RHM	8-32x3/8
9B	Washer	#8
10	Stop Slide	X-3320-A
11	Motor and Term Assembly	Y-3958-T
11A	Nut, Hex	6-32
12	Mounting Plate Assembly	X-4263-R
12A	Screw, RHM	8-32x3/8
13	Spacers	X-4141-A
14	Gear and Pinion Assembly	X-3373-R
14A	Hairpin Cotter	X-604-A
15	Terminal Plate	X-4253-A
15A	Screw, RHM	6-32x3/8
16	Bolt, Carriage	8-32x3/4
16A	Nut, Hex	8-32
16B	Washer	#8
17	Contact Spring	X-3967-A
17A	Screw, RHM	6-32x1/4
18	Housing Assembly, LH	Y-3381-R
19	Gasket	X-3384-A
20	Terminal Cover	X-3386-G
20A	Screw	6-32x3/16
21	Strain Relief Clamp	X-3380-A
21A	Screw, RHM	6-32x1/2
21B	Nut, Hex	6-32
22	Grommet	X-11-D
23	Set Screw	X-3696-A
23A	Nut, Hex	10-32
24	Potentiometer	Y-3960-S
	Control Box Complete	Z-3968-S
101	Case	Z-3390-R
101A	Screw	6-32x1/4
102	Front Panel Assembly	Y-3969-R
102A	Speed Nut	X-3459-D
103	Transformer	Y-4213-T
103A	Speed Nut	X-3459-D
104	Terminal Strip Assembly	X-3803-R
104A	Speed Nut	X-3459-E
105	Capacitor	X-4098-A
106	Bumper (feet)	X-3393-A
108	Calibrating Res.	X-4094-B

The PHOTOFACT Servicer

Vol. 25, Nos. 241 & 242 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ April 1, 1954

The following information on the Alliance Tenna-Rotor Model HIR is presented through the courtesy of Alliance Manufacturing Co., Alliance, Ohio.

GENERAL INFORMATION

The Alliance Tenna-Rotor Model HIR is a fully automatic unit. The selector dial indicator on the control box is turned to the desired direction and the rotator automatically rotates the antenna to that position and stops. A light on the control box comes on and follows the antenna rotation around, turning off when the antenna reaches the desired position. This unit operates at a speed of one RPM, and can be identified by the grey neoprene weather shield.

SERVICING PROCEDURE

Power-off Checks

1. Be sure the four-conductor cable is connected to proper terminals. Terminal No. 1 in the rotator, should be connected to Terminal No. 1 in the control box and so on with No's. 2, 3, and 4.

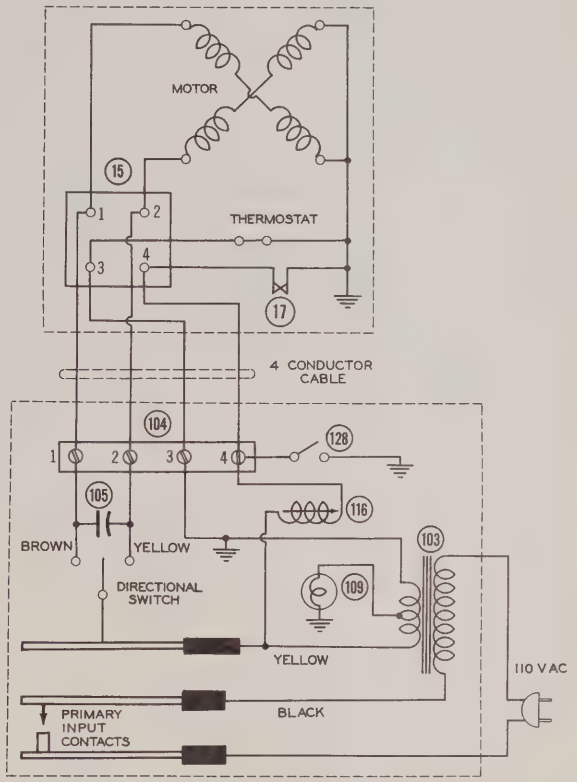
2. Set-screw (Item #23) must be backed off from finger tight 1/4 to 1/2 turn, and nut (Item #23A) tightened.

3. Hollow shaft (Item #4) must have "play".

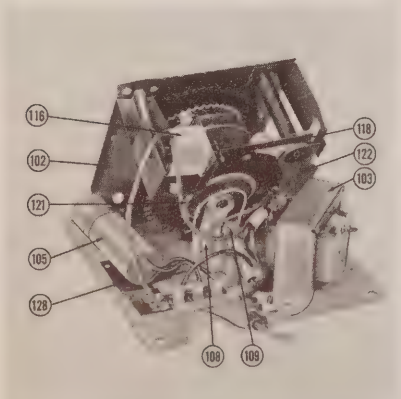
4. Contact screw (Item #125) must be adjusted for .012 to .015 gap when mechanism is at "home" position.

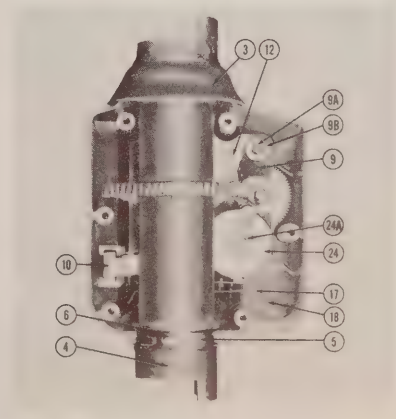
5. Input contacts must open on release only (de-energized position) of solenoid for both directions of escapement assembly rotation. Adjustment is made by moving tie-plate (Item #122) up or down, then tightening with screw and nut (Items #122A and B).

6. Top leg of verge (Item #118) must fall 3/4 of the way into teeth of escapement wheel, on energize position of the solenoid. Adjustment is made by moving solenoid on its supporting bracket.



7. Bottom leg of verge (Item #118) must fall 3/4 of the way into teeth of escapement wheel on de-energize position of the solenoid. Adjustment is made by bending top of stop bracket so bumper stop (Item #120) position is changed.



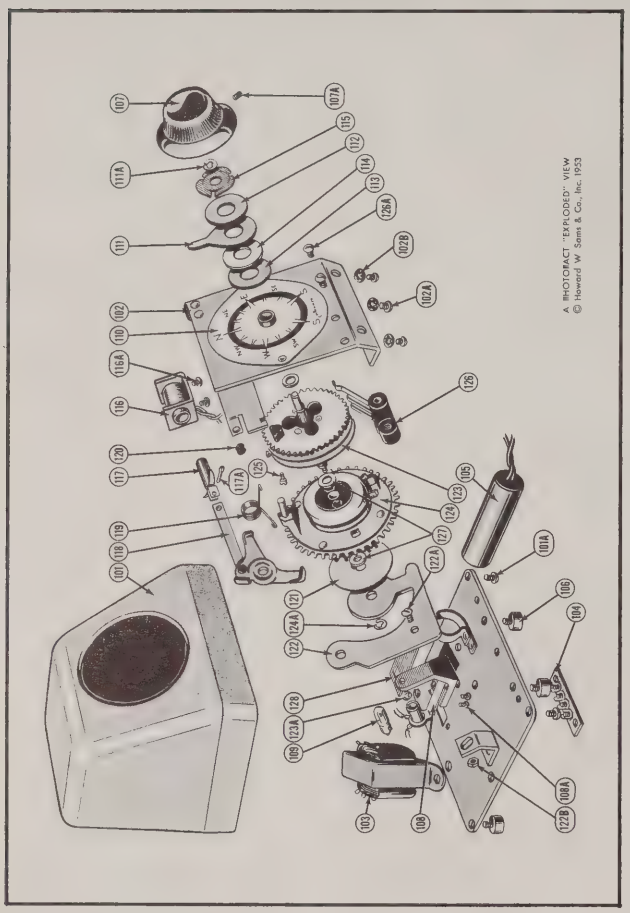


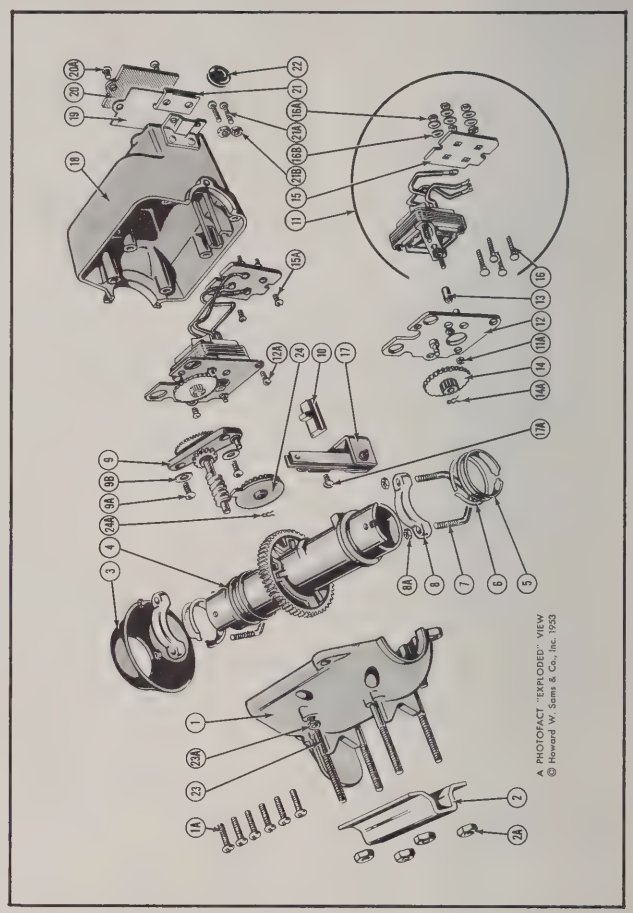
Power-on Checks

1. Line voltage should be approximately 115 volts.

2. Turn knob (Item #107) to extreme counter-clockwise stop. Solenoid must not buzz and mechanism must move correctly, no sticking or slipping. Rotator must turn to extreme counter-clockwise stop and light must pulse with every movement of the escapement assembly. Light must turn off when rotator reaches the stop.

3. Turn knob (Item #107) to extreme clockwise stop. There must be 36 light pulses and the light must go off when the rotator reaches the stop.





PARTS LIST

ITEM	NAME	PART NO.	ITEM	NAME	PART NO.
	Rotator Assembly	Z-4203-R		Control Box Complete	Z-4300-R
1	Housing Assembly, RH	Y-3383-R	101	Case	Z-4238-A
1A	Housing Screws	10-32x3/4	101A	Screw, RHM	10-32x3/8
2	Clamping Plate	X-3768-A	102	Front Panel Assembly	Z-4301-R
2A	Nuts, Hex	1/4 - 20	102A	Screw, RHM	6-32x1/4
3	Weather Shield	X-3375-C	102B	Lockwasher	#6
4	Shaft Assembly	Y-3378-R	103	Transformer	Y-4387-B
5	Bearing Collar	X-3987-A	104	Terminal Strip Assembly	X-3803-R
6	Thrust Washer	X-3376-A	105	Capacitor	X-4098-A
7	U-Bolt	X-3377-A	106	Bumper (feet)	X-4252-A
8	Mast Clamp	X-3319-A	107	Knob	Y-4239-A
8A	Nut, Hex	10-32	107A	Set Screw	S-614-N
9	Worm Assembly	Y-4321-R	108	Rear Support Assembly	Y-4316-R
9A	Screw, RHM	8-32x3/8	108A	Screw, RHM	6-32x1/4
9B	Washer	#8	109	Bulb (Type 47)	X-4274-A
10	Stop Slide	X-3320-A	110	Dial	Y-4510-A
11	Motor and Term Assembly	Y-4204-R	111	Pointer	X-4270-A
11A	Nut, Hex	6-32	111A	Retaining Ring	X-4243-A
12	Mounting Plate Assembly	X-4263-R	112	Washer	X-4280-A
12A	Screw, RHM	8-32x3/8	113	Washer	X-4280-B
13	Spacers	X-4141-A	114	Washer, fish paper	X-3535-F
14	Gear and Pinion Assembly	X-3373-R	115	Spring Washer	X-4284-A
14A	Hairpin Cotter	S-604-A	116	Solenoid	Y-4282-R
15	Terminal Plate	X-4253-A	116A	Screw RHM	6-32x1/4
15A	Screw, RHM	6-32x3/8	117	Plunger Assembly	Y-4566-R
16	Bolt, Carriage	8-32x3/4	117A	Cotter Pin	S-606-C
16A	Nut, Hex	8-32	118	Verge Assembly	Y-4318-R
16B	Washer	#8	119	Verge Spring	X-4317-A
17	Contact Sw. Assembly	Y-4323-R	120	Bumper Stop	X-4299-A
17A	Screw, RHM	6-32x3/16	121	Light Shield	X-4285-A
18	Housing Assembly, LH	Y-3381-R	122	Tie Plate	Y-4505-A
19	Gasket	X-3384-A	122A	Screw, RHM	6-32x3/8
20	Terminal Cover	X-3386-F	122B	Nut, Hex	6-32
20A	Screw	6-32x3/16	123	Ratchet Support Assembly	Z-4305-R
21	Strain Relief Clamp	X-3380-A	123A	Retaining Ring	Y-3893-A
21A	Screw, RHM	6-32x1/2	124	Escapement Assembly	Z-4309-R
21B	Nut, Hex	6-32	124A	Retaining Ring	X-4243-A
22	Grommet	X-11-D	125	Contact Screw	X-4262-A
23	Set Screw	X-3696-A	126	Terminal Block Assembly	Y-4313-R
23A	Nut, Hex	10-32	126A	Screw, RHM	6-32x3/8
24	Cam and Gear	X-4292-B	127	Washer	X-4279-A
24A	Hairpin Cotter	S-604-C	128	Tuning Spring	X-4276-A

The PHOTOFACT Servicer

Vol. 25, Nos. 243 & 244 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ April 15, 1954

NEW PARTICIPANTS

We are pleased to announce the following new participants:

CBS-Hytron picture tubes are listed starting with PHOTOFACT Folder Set No. 242.

International Rectifier selenium rectifier replacements will be listed in PHOTOFACT Folders beginning with Set No. 244.

CORRECTION NOTES

CBS Columbia Models 18C18, 18L18, 18M08, 18M18, 18T18 (Ch. 817-6), 22C08, 22C18, B, 22C28, 22L18, 22M08, 22M18, 22T18 (Ch. 821-6, A)
Photofact Set 214, Folder 2
Model 22K38 (Ch. 821-20)
Photofact Set 225, Folder 8

Note 10 (Photofact Set 214, Folder 2) and Note 9 (Photofact Set 225, Folder 8) on Page 15 under Transformer (Sweep Circuits) should read as follows:

Connect blue lead of transformer to plate. Connect green lead of transformer to brown lead of yoke. Remove green lead of yoke from its present terminal and connect it and red lead of transformer to boosted B+ (terminal to which red lead of original transformer was connected).

Emerson Models 741F, 757D
(Ch. 120182-D, 781A, B, (Ch. 120196-B), 784E, G (Ch. 120197-B, -D), 785K (Ch. 120195-D)
Photofact Set 235, Folder 5

Alignment Instructions, Page 6.

To eliminate high voltage shock hazard remove the horizontal oscillator tube (V14) from its socket and insert a 6 volt bias battery in the grid circuit of the 6BQ6 (V15).

In Step 8 and 9 the Signal Generator Coupling should be to pin 2 (grid) of 6CB6 (V7).

Crosley Models F-24CDBH, CDBU, CDMH, CDMU (Ch. 412, -1), F-27COBH, COBU, COMH, COMU (Ch. 416, -1)
Photofact Set 234, Folder 5

Parts List, Pages 14 and 15

The following notes should be added under Transformer (Sweep Circuit) section:

① Complete Assembly - includes the following items:

Transformer Winding	- Part 155387
Transformer Core	- Part 155391
Mtg. Board Assembly	- Part 155338
Spring, Clip	- Part 155279
Spring, Strap	- Part 155386
Terminal Board	- Part 155386

② Alternate vertical output transformer.

③ Alternate yoke.

④ Use original yoke network.

Sylvania Models Series 105-14, 105-14U, 120-20, 120-20U, 300, 300U, 301, 301U, 306, 306U, 320, 325, 325U, 326, 326U (Ch. 1-514, -1, -3, -4, -5, -6, 1-520-0, -1, -3, -4, -7, -8)
Photofact Set 234, Folder 13

Tube Placement Chart, Page 10.

The HV Rectifier (V20) and the LV Rectifier (V21) should be transposed.

FACTORY SERVICE HINTS

The following service hints covering Arvin Television receivers are brought to you through the courtesy of Arvin Industries, Inc.

Chassis TE358, -1, -2, -3, TE363, -1, -2, -3
Photofact Set 238, Folder 4
Chassis TE359, -1, TE364, -1
Photofact Set 235, Folder 2

Subject: Eliminating white horizontal lines in the picture with contrast and brightness control at near maximum setting.

Procedure: Use the following procedure to make the necessary changes in vertical blanking circuit.

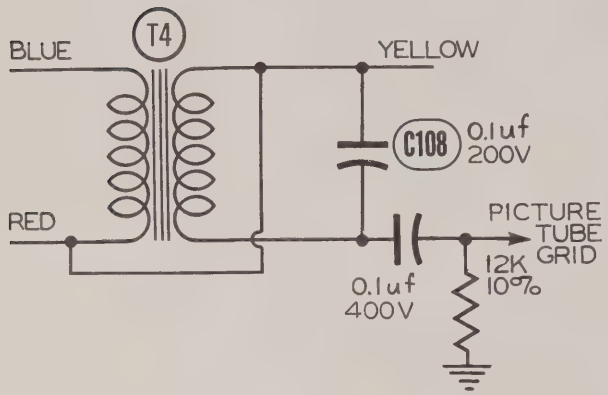
1. Disconnect lead to junction of C106, R93 and R94. Note: R94 was not used in early production TE358 and TE363 chassis. On these two chassis remove and discard C132, 4700 MMF, and R132, 100K, connected to the grid lead of the picture tube (green wire).

2. Connect a .1 MFD, 200V, capacitor (25455-104) across the secondary (yellow to green leads) of the vertical output transformer T4. This capacitor may already be in this circuit of the

following chassis: TE358-1, TE363-1, TE359, TE364 (C108).

3. Connect a .1 MFD, 400V, capacitor (25462-104) to the junction of the .1 MMF, 200V, capacitor and the green lead of the vertical output transformer T4.

4. Connect a 12K ohm, 10%, resistor (22381-123) from the other end of the .1 MFD, 400V, capacitor to ground. Connect the grid lead of the picture tube (green wire) to the junction of these two parts.



Chassis TE319, -1, TE330, -1,
-2, -3, TE332, -1
Photofact Set 228, Folder 2
(Also PCB88, Set 231-1)
Chassis TE331-3
Photofact Set 181, Folder 4
(Also PCB66, Set 203-1)

Subject: Improving Sync Stability.

Procedure: An Improvement in over-all sync stability under the presence of impulse-type noise interference in fringe areas can be accomplished by lowering the screen voltage on the video amplifier, 6AC7. Although this change may introduce a slight decrease in picture contrast, this should not prove to be detrimental on a comparison basis.

The following additional parts are needed:

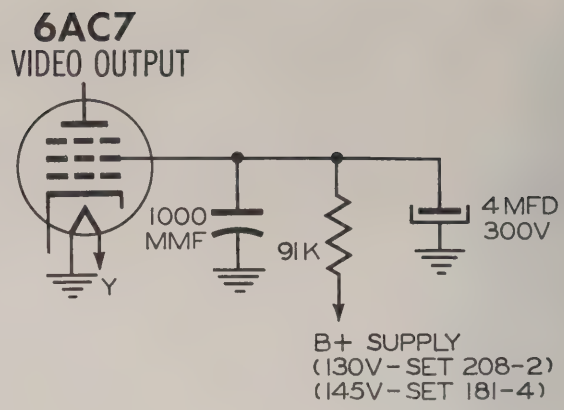
1 - 4 MFD, 300V. electrolytic capacitor
1 - 91K, 1/2 W., resistor

1. Follow orange wire from Pin 6 of 6AC7 to terminal strip lug.

2. Remove this wire from lug and reroute wire to blank lug of adjacent terminal strip, one inch away.

3. Add 81K resistor between old lug and new lug.

4. Add 4 MFD capacitor between new lug and chassis ground lug.



Chassis TE358, -1, -2, -3, TE363, -1, -2, -3
Photofact Set 238, Folder 4
Chassis TE359, -1, TE364, -1
Photofact Set 235, Folder 2

Subject: Under certain signal conditions interference in the picture caused by radiation from 6BN6 circuit may be present.

Procedure: To check for this type of interference remove 6BN6 tube from set. If this interference disappears make the following changes:

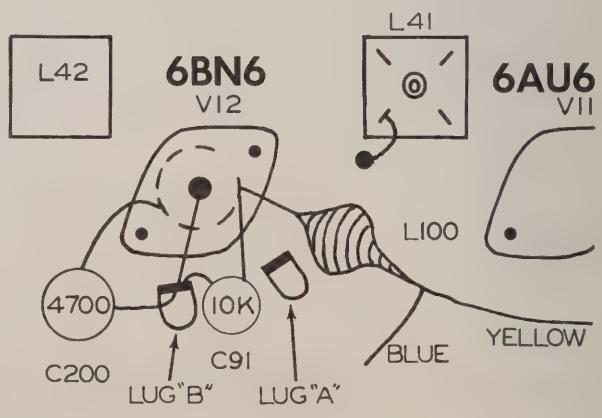
1. Remove ground side of C91 from lug A and move to lug B. (See sketch.)

2. Remove blue and yellow leads from pin 1 of 6BN6 socket and add a series peaking coil L100 between these leads and pin 1 (40 to 200 Microhenry choke).

3. Add a 4700 MMF capacitor (C200) from pin 4 of 6BN6 socket to lug B.

4. Make ground lead from pin 1 of L41 as short as possible by soldering it directly to the chassis.

5. Add grounded shield to 6BN6 tube. This primarily affects UHF channels.



The PHOTOFACT Servicer

Vol. 25, Nos. 245 & 246 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ May 15, 1954

REGISTRATION LISTS

of

RETMA PRODUCTION SOURCE CODE

January, 1954

Code symbols assigned to radio-television manufacturers and suppliers, arranged both alphabetically by companies and numerically by code numbers.

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Indianapolis 5, Indiana

Company	Code No.
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*R. Prescott & Son, Inc., Keeseville, N. Y.	356
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*Q. L. C. Corporation, Summit, N. J.	464
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Rada Products Co., Chicago 12, Illinois	482
Radell Corporation, Santurce 34, P. R.	829
Radio Apparatus Corporation, Indianapolis 4, Ind.	702
Radio Condenser Company, Camden 3, N. J.	273
Radio Corporation of America, RCA Victor Division, Camden, N. J.	274
The Radio Craftsmen, Inc., Chicago 40, Ill.	275
Radio Engineering Laboratories, Inc., Long Island City 1, N. Y.	276
*Radio Industries, Inc., Chicago 40, Ill.	540
Radio Materials Corporation, Chicago 18, Ill.	732
The Radion Corporation, Chicago 14, Ill.	700
*Radio Receptor Company, Inc., New York 11, N. Y.	380
Radio Specialty Manufacturing Co., Portland 14, Oregon	587
*Radio Television Products Corp., Grass Lake, Mich.	489
RAM Electronics, Inc., Irvington-on-Hudson, N. Y.	617
*Ratel, Inc., Monrovia, Calif.	835
Raytheon Manufacturing Company, Waltham 54, Mass.	280
Rea Magnet Wire Company, Inc., Fort Wayne 4, Ind.	281
Rectifier Corporation of Puerto Rico, Fajardo, P. R.	844
*Red Lion Cabinet Company, Red Lion, Pa.	384
Rego Insulated Wire Co., Hoboken, N. J.	778
Reiner Electronics Co., Inc., New York 1, N. Y.	846
Rek-O-Kut Company, Long Island City 1, N. Y.	282
Remington Rand Inc., South Norwalk, Conn.	283
Remler Company, Ltd., San Francisco 10, Calif.	284
*Resistance Products Company, Harrisburg, Penna.	873
Rhode Island Insulated Wire Co., Inc., Cranston, R. I.	678
*Rogers Electronic Corp., New York 12, N. Y.	677
The Rola Company, Inc., Div. of The Muter Company, Cleveland 14, Ohio	285
*Rollan Electric Co., Chicago 19, Ill.	721
The Ross Manufacturing Company, Burlington, Iowa	286
*Rowe Industries, Toledo 9, Ohio	580
*Royal Transformer Corporation, Chicago 30, Ill.	858
*Russell Speaker Company, Chicago 29, Ill.	748
*Sampson Electric Products Co., Clinton, N. C.	518
San Fernando Electric Mfg. Co., San Fernando, Calif.	815
Sangamo Electric Company, Marion, Ill.	658
*Santay Corporation, Chicago 24, Ill.	368
*Sarkes Tarzian, Inc., Bloomington, Ind.	684
Schneider & Marquard, Inc., Brooklyn 17, N. Y.	520
Walter L. Schott Company, Los Angeles 18, Calif.	287
J. P. Seeburg Corporation, Chicago 22, Ill.	289
Sentinel Radio Corporation, Evanston, Ill.	291
Sheffco Manufacturing Co., Palisades Park, N. J.	698
*Sheldon Electric Company, Div. of Allied Electric Products, Inc., Irvington 11, N. J.	636
Sherron Electronics Company, Div. of Sherron Metallic Corp., Brooklyn 6, N. Y.	293
Shoup Engineering Company, Chicago 4, Ill.	674
Shure Brothers, Incorporated, Chicago 10, Ill.	590
Shurite Meters (J-B-T Instruments, Inc.), New Haven 8, Conn.	484
F. W. Sickles Division, Sub. of General Instrument Corp., Chicopee, Mass.	294
Simpson Electric Company, Chicago 44, Ill.	614
*Mark Simpson Manufacturing Co., Inc., Long Island City 3, N. Y.	295
*Solar Manufacturing Corporation, Los Angeles 58, Calif.	296
*Sonora Radio & Television Corp., Chicago 12, Ill.	297
*Sonotone Corporation, Elmsford, N. Y.	787
*Soreng Products Corporation, Schiller Park, Ill.	711
*Sparton Radio-Television Division, The Sparks Withington Company, Jackson, Mich.	299
Special Products Company, Silver Spring, Md.	474
Speer Résistor Division, Speer Carbon Company, St. Marys, Penna.	300
Spencer Kennedy Laboratories, Inc., Cambridge 39, Mass.	782
*Sperti Faraday Inc., Cincinnati 2, Ohio	302
Sprague Electric Company, North Adams, Mass.	303
Square Root Manufacturing Company, Yonkers 2, N. Y.	654
Stackpole Carbon Company, St. Marys 3, Pa.	304
*Standard Coil Products Co., Inc., Chicago 39, Ill.	305
*Standard Condenser Company, Chicago 47, Ill.	710
*Standard Electrical Products Co., Dayton 3, Ohio	668
Standard Electronics Corporation, Newark 5, N. J.	694
Standard Piezo Company, Carlisle, Pa.	501
*Standard Winding Company, Newburgh, N. Y.	550
*Stanwyck Winding Company, Newburgh, N. Y.	574
The Staver Company Incorporated, Bay Shore, L. I.	604
Stevens Wire Insulating Company, Chicago 30, Ill.	597
Stewart-Warner Electric, Div. of Stewart-Warner Corporation, Chicago 51, Ill.	307
*Stoddart Aircraft Radio Co., Hollywood 38, Calif.	369
Stone City Machine & Tool Co., Inc., Bedford, Ind.	770
Stromberg-Carlson Company, Rochester 3, N. Y.	308
Stupakoff Ceramic & Mfg. Co., Latrobe, Pa.	309
Superior Tube Company, Norristown, Pa.	310
Supreme, Incorporated, Greenwood, Miss.	311
*Supreme Transformer Corporation, Chicago 12, Ill.	798
Surprenant Mfg. Co., Boston 8, Mass.	624
Swett & Sibley Company, Inc., Cambridge 38, Mass.	853
Sylvania Electric Products Inc., Emporium, Penna.	312
Symphonic Radio and Electronic Corp., Boston 14, Mass.	351
Synthane Corporation, Oaks, Pa.	313
*Syntronic Instruments, Inc., Addison, Ill.	822
*Syracuse Ornamental Co., Inc., Syracuse 2, N. Y.	314
Talk-A-Phone Co., Chicago 23, Ill.	132
Taylor Tubes, Inc., Chicago 47, Ill.	713
*Tech-Master Products Company, New York 13, N. Y.	679
Technical Appliance Corporation, Sherburne, N. Y.	737
Technology Instrument Corporation, Acton, Mass.	715
Tele King Corporation, New York 1, N. Y.	583
Telequip Radio Company, Chicago 8, Ill.	454
*Teleradio Engineering Corporation, Wilkes Barre, Pa.	357
*Tele-Ray Tube Co., Inc., Yonkers, N. Y.	864
Tel-Instrument Co., Inc., Carlstadt, N. J.	536
*Tel-O-Tube Corporation of America, East Paterson, N. J.	818
*TELvision Laboratories, Inc., Wauconda, Ill.	608
*Tempel Manufacturing Company, Chicago 26, Ill.	745
Tempo T-V Products Company, Los Angeles 47, Calif.	802
The Tetrad Company, Yonkers 2, N. Y.	842
*Thermador Electrical Mfg. Co., Los Angeles 22, Calif.	825
*Thomas & Skinner Steel Products Co., Indianapolis 7, Ind.	318
Thomas Associates, Los Angeles 38, Calif.	880
Thomas Electronics, Inc., Passaic, N. J.	672
*Thordarson-Meissner, Mt. Carmel, Ill.	238
*Ticon Inc., Bridgeport, Conn.	690
T J Mfg. Corporation, Martinsville, Ind.	854
*Todd Products Co., Inc., Mt. Vernon, N. Y.	634
*Todd-Tran Corp., Mt. Vernon, N. Y.	635
*B. J. Toegel, Inc., Plainfield, N. J.	548
*Trad Television Corporation, Asbury Park, N. J.	688
Transistor Products, Inc., Boston 35, Mass.	856
Translite Electronics Corp., Chicago 39, Ill.	810
Trav-Ler Radio Corporation, Chicago 6, Ill.	320
*Triad Transformer Corporation, Venice, Calif.	830
Triplett Electrical Instrument Co., Bluffton, Ohio	321
Tristao Manufacturing Company, Kansas City 6, Mo.	874
*Triwec-Transformer Company, Chicago 18, Ill.	524
Tung-Sol Electric Inc., Newark 4, N. J.	322
The Turner Company, Cedar Rapids, Iowa	696
*TV Products Corporation, Paterson 3, N. J.	618
*Union Electric & Manufacturing Co., Jersey City, N. J.	804
*United-Carr Fastener Corporation, Cambridge 42, Mass.	370
United Condenser Corporation, New York 54, N. Y.	516
United Electronics Company, Newark 4, N. J.	323
*United Electronic Manufacturing Corp., Union City, N. J.	820
*United States Radium Corporation, New York 7, N. Y.	324
*United Transformer Corporation, New York 13, N. Y.	418
Universal Company, High Point, N. C.	756
Universal Vacuum Tube Corp., Yonkers 2, N. Y.	821
University Loudspeakers, Inc., White Plains, N. Y.	847
Utah Radio Products Co., Inc., Huntington, Ind.	328
Vacuum Tube Products, Oceanside, Calif.	781
Valpey Crystal Corporation, Holliston, Mass.	527
Varian Associates, Palo Alto, Calif.	809
Vidaire Electronics Mfg. Co., Lynbrook, L. I., N. Y.	797
*Videocraft Manufacturing Co., Chicago 39, Ill.	824
Videon Electronic Corporation, Indianapolis 4, Ind.	765
*V-M Corporation, Benton Harbor, Mich.	857
Vokar Corporation, Dexter, Mich.	168
John Volkert Metal Stampings, Inc., Queens Village 29, Long Island, N. Y.	507
*Waldom Electronics, Inc., Chicago 10, Ill.	555
Wm. T. Wallace Mfg. Co., Inc., Peru, Ind.	330
*Ward Leonard Electric Co., Mount Vernon, N. Y.	532
Ward Products Corporation, Division of the Gabriel Company, Cleveland 15, Ohio	331
*Warwick Manufacturing Corporation, Chicago 44, Ill.	332
Waterman Products Company, Inc., Philadelphia 25, Pa.	431
Waters Conley Company, Rochester, Minn.	382
*Webster-Chicago Corporation, Chicago 39, Ill.	375
Weller Electric Corporation, Easton, Pa.	662
Wells-Gardner & Co., Chicago 39, Ill.	334
Wm. H. Welsh Co., Inc., Chicago 16, Ill.	335
*Wesco Electric Company, Inc., Chicago 31, Ill.	553

Company	Code No.
Western Electric Company, Inc., New York 5, N. Y.	336
Westinghouse Electric Corporation, Baltimore 3, Md.	337
Weston Electrical Instrument Corp., Newark 5, N. J.	338
*The Wheeler Insulated Wire Company, Inc., Waterbury 20, Conn.	392
Wheeler Laboratories, Inc., Great Neck, N. Y.	529
The Whitney Blake Company, New Haven 14, Conn.	741
*Wilcox Electric Company, Inc., Kansas City 27, Mo.	339
Wind Turbine Company, West Chester, Pa.	653
Winsted Division, Hudson Wire Company, Winsted, Conn.	666
*Wirt Company, Philadelphia 44, Penna.	406
W. M. C. Inc., Chicago 47, Ill.	584
Woodward-Schumacher Electric Corporation, Chicago 22, Ill.	606
*Worthco Corporation, Beverly Hills, Calif.	785
Wright Zimmerman, Inc., New Brighton, Minn.	683
The Yale & Towne Manufacturing Co., Powdered Metal Products Division, Franklin Park, Ill.	539
*The Zell Products Corp., Norwalk, Conn.	342
Zenith Radio Corporation, Chicago 39, Ill.	343
Z & W Machine Products Inc., Cleveland 3, O.	819

NUMERICAL LIST

RETMA Production Source Code Symbols

January 1, 1954

(* Indicates non-members)

Code No.	Company
101	*Admiral Corporation, Chicago 47, Ill.
102	Aerovox Corporation, New Bedford, Mass.
105	CBS-Columbia, Division of Columbia Broadcasting System, Inc., Long Island City 1, N. Y.
106	Allen-Bradley Company, Milwaukee 4, Wis.
107	The Alliance Manufacturing Co., Alliance, Ohio
109	American Condenser Company, Chicago 40, Ill.
110	All Star Products, Inc., Defiance, Ohio
111	Amperex Electronic Corporation, Hicksville, L. I., N. Y.
112	Amy, Aceves & King, Inc., New York 18, N. Y.
113	*Andrea Radio Corporation, Long Island City 1, N. Y.
115	A. R. F. Products, Inc., River Forest, Ill.
116	The Arnold Engineering Company, Sub. of Allegheny Ludlum Steel Corp., Marengo, Ill.
118	*Audio-Tone Oscillator Company, Long Hill, Conn.
119	Automatic Manufacturing Corp., Newark 4, N. J.
120	Automatic Radio Mfg. Co., Inc., Boston 15, Mass.
122	The Bead Chain Manufacturing Co., Bridgeport 5, Conn.
125	Bendix Radio, Division of Bendix Aviation Corporation, Baltimore 4, Md.
126	Bentley, Harris Manufacturing Co., Conshohocken, Pa.
128	Bliley Electric Company, Erie, Pa.
130	The William Brand and Co., Inc., Willimantic, Conn.
132	Talk-A-Phone Co., Chicago 23, Ill.
133	C. F. Cannon Co., Springwater, N. Y.
134	Centralab, Div. of Globe-Union Inc., Milwaukee 1, Wis.
135	Chicago Condenser Corporation, Chicago 47, Ill.
137	Chicago Telephone Supply Corp., Elkhart, Ind.
138	Chicago Standard Transformer Corp., Chicago 18, Ill. (Chicago Division)
139	Cinch Manufacturing Corporation, Chicago 24, Ill.
140	Clarostat Mfg. Co., Inc., Dover, New Hampshire
141	*Coil Engineering & Mfg. Co., Inc., Roanoke, Ind.
145	*Consolidated Radio Products Co., Chicago 10, Ill.
146	Continental Carbon Inc., Cleveland 11, Ohio
147	*Continental Electric Company, Geneva, Ill.
148	Corning Glass Works, Corning, N. Y.
149	Cornish Wire Company, Inc., New York 7, N. Y.
150	Crescent Industries, Inc., Chicago 31, Ill.
151	Croname, Incorporated, Chicago 13, Ill.
152	Crosley Radio and Television Division, Avco Manufacturing Corporation, Cincinnati 25, Ohio
154	*Tobe Deutschmann Corporation, Norwood, Mass.
155	DeWald Radio Mfg. Corp., Long Island City 1, N. Y.
156	Wilbur B. Driver Company, Newark 4, N. J.
157	*Dumont-Airplane & Marine Instruments, Inc., New York 5, N. Y.
158	Allen B. DuMont Laboratories, Inc., Clifton, N. J.
160	Hugh H. Eby, Inc., Philadelphia 44, Pa.
161	Eckstein Radio & Television Co., Minneapolis 6, Minn.
162	Eitel-McCullough, Inc., San Bruno, Calif.
163	Hi-Q Division Aerovox Corporation, Olean, N. Y.
164	The Electro Motive Mfg. Co., Inc., Willimantic, Conn.
168	Vokar Corporation, Dexter, Michigan
169	*Electronic Specialty Co., Los Angeles 39, Calif.
170	Electronic Tube Corporation, Philadelphia 18, Pa.
171	Emerson Radio & Phonograph Corp., New York 11, N. Y.
172	Ensign Coil Company, Chicago 23, Ill.
173	Erie Resistor Corporation, Erie, Pa.
174	Espey Manufacturing Company, Inc., New York 21, N. Y.
175	*Essex Wire Corporation, Fort Wayne 6, Ind.
176	Fada Radio and Electric Co., Inc., Belleville, N. J.
177	Capehart-Farnsworth Company, Fort Wayne 1, Ind.
178	John E. Fast & Company, Chicago 41, Ill.
179	Federal Telephone and Radio Company, Clifton, N. J.
183	*Freed Electronics and Controls Corp., New York 13, N. Y.
185	Motorola Inc., Chicago 51, Ill.
187	*Gates Radio Company, Quincy, Ill.
188	General Electric Company, Syracuse 1, N. Y.
189	*General Electronics, Inc., Paterson 3, N. J.
190	The General Industries Company, Elyria, Ohio
191	General Instrument Corporation, Elizabeth 3, N. J.
192	General Laminated Products, Inc., Chicago 8, Ill.
193	General Magnetic Corporation, Detroit 34, Mich.
194	General Radio Company, Cambridge 39, Mass.
196	*Gits Molding Corporation, Chicago 44, Ill.
197	The Fred Goat Co., Inc., Brooklyn 17, N. Y.
198	Edwin I. Guthman & Company, Inc., Chicago 7, Ill.
199	The Hallicrafters Company, Chicago 24, Ill.
200	Olympic Radio & Television Inc., Long Island City 1, N. Y.
204	Hawley Products Company, St. Charles, Ill.
205	Haydu Brothers, Plainfield, N. J.
207	Hoffman Radio Corporation, Los Angeles 7, Calif.
210	CBS-Hytron, Division of Columbia Broadcasting System, Inc., Danvers, Mass.
211	The Indiana Steel Products Company, Chicago 2, Ill.
214	International Resistance Company, Philadelphia 8, Pa.
215	Irvington Varnish & Insulator Co., Irvington 11, N. J.
216	Jackson Electrical Instrument Co., Dayton 2, Ohio
217	Jackson Electronics & Television, Inc., Chicago 15, Ill.
218	Jefferson Electric Company, Bellwood, Ill.
219	Jefferson-Travis Incorporated, Sub. Emerson Radio & Phonograph Corp., Brooklyn, N. Y.
220	Jensen Manufacturing Company, Div. of The Muter Company, Chicago 38, Ill.
221	J. F. D. Manufacturing Co., Inc., Brooklyn 4, N. Y.
222	E. F. Johnson Company, Waseca, Minn.
223	Kerrigan Lewis Manufacturing Co., Chicago 51, Ill.
224	Kester Solder Company, Chicago 39, Ill.
225	King Laboratories, Inc., Syracuse 4, N. Y.
227	*Lear, Incorporated, Grand Rapids 2, Mich.
228	Lenz Electric Manufacturing Co., Chicago 47, Ill.
230	Littelfuse, Incorporated, Des Plaines, Ill.
231	Machlett Laboratories, Incorporated, Springdale, Conn.
232	The Magnavox Company, Fort Wayne 4, Ind.
235	P. R. Mallory & Co., Inc., Indianapolis 6, Ind.
236	Measurements Corporation, Boonton, N. J.
238	*Thordarson-Meissner, Mt. Carmel, Ill.
239	*Merit Transformer Corp., Chicago 40, Ill.
240	Micamold Radio Corporation, Brooklyn 37, N. Y.
242	James Millen Manufacturing Co., Inc., Malden 48, Mass.
244	The Muter Company, Chicago 5, Ill.
245	National Company, Inc., Malden 48, Mass.
246	National Fabricated Products, Inc., Chicago 47, Ill.
247	National Union Radio Corporation, Hatboro, Penna.
248	Arvin Industries, Inc., Columbus, Ind.
249	Oak Mfg. Co., Chicago 10, Ill.
250	The Ohio Carbon Company, Cleveland 11, Ohio
251	Ohmite Manufacturing Company, Skokie, Ill.
252	DuKane Corporation, St. Charles, Ill.
254	Packard-Bell Company, Los Angeles 64, Calif.
257	Parisian Novelty Company, Chicago 9, Ill.
258	Permoflux Corporation, Chicago 39, Ill.
259	Permo, Incorporated, Chicago 26, Ill.
260	Philco Corporation, Philadelphia 34, Pa.
262	Philmore Manufacturing Co., Inc., New York 3, N. Y.
264	Pilot Radio Corporation, Long Island City 1, N. Y.
267	Premax Products Division, Chisholm-Ryder Co., Inc., Niagara Falls, N. Y.
270	Quam-Nichols Company, Chicago 37, Ill.
273	Radio Condenser Company, Camden 3, N. J.
274	Radio Corporation of America, RCA Victor Division, Camden, N. J.
275	The Radio Craftsmen, Inc., Chicago 40, Ill.
276	Radio Engineering Laboratories, Inc., Long Island City 1, N. Y.
279	*Peirce Wire Recorder Corporation, Chicago 31, Ill.
280	Raytheon Manufacturing Company, Waltham 54, Mass.
281	Rea Magnet Wire Company, Inc., Fort Wayne 4, Ind.
282	Rek-O-Kut Company, Long Island City 1, N. Y.
283	Remington Rand Inc., South Norwalk, Conn.
284	Remler Company, Ltd., San Francisco 10, Calif.
285	The Rola Company, Inc., Div. of The Muter Company, Cleveland 14, Ohio
286	The Ross Manufacturing Company, Burlington, Iowa
287	Walter L. Schott Company, Los Angeles 18, Calif.

Code No.	Company
289	J. P. Seeburg Corporation, Chicago 22, Ill.
291	Sentinel Radio Corporation, Evanston, Ill.
293	Sherron Electronics Company, Div. of Sherron Metallic Corp., Brooklyn 6, N. Y.
294	F. W. Sickles Division, Sub. of General Instrument Corp., Chicopee, Mass.
295	*Mark Simpson Manufacturing Co., Inc. Long Island City 3, N. Y.
296	*Solar Manufacturing Corporation, Los Angeles 58, Calif.
297	*Sonora Radio & Television Corp., Chicago 12, Ill.
299	*Sparton Radio-Television Division, The Sparks Withington Company, Jackson, Mich.
300	Speer Resistor Corporation, Saint Marys, Pa.
302	*Sperti Faraday Inc., Cincinnati 2, Ohio
303	Sprague Electric Company, North Adams, Mass.
304	Stackpole Carbon Company, St. Marys 3, Pa.
305	*Standard Coil Products Co., Inc., Chicago 39, Ill.
306	Chicago Standard Transformer Corp., Chicago 18, Ill. (Standard Division)
307	Stewart-Warner Electric, Div. of Stewart-Warner Corporation, Chicago 51, Ill.
308	Stromberg-Carlson Company, Rochester 3, N. Y.
309	Stupakoff Ceramic & Mfg. Co., Latrobe, Pa.
310	Superior Tube Company, Norristown, Pa.
311	Supreme, Incorporated, Greenwood, Miss.
312	Sylvania Electric Products Inc., Emporium, Pa.
313	Synthane Corporation, Oaks, Pa.
314	*Syracuse Ornamental Co., Inc., Syracuse 2, N. Y.
318	*Thomas & Skinner Steel Products Co., Indianapolis 7, Ind.
320	Trav-Ler Radio Corporation, Chicago 6, Ill.
321	Triplett Electrical Instrument Co., Bluffton, Ohio
322	Tung-Sol Electric Inc., Newark 4, N. J.
323	United Electronics Company, Newark 4, N. J.
324	*United States Radium Corporation, New York 7, N. Y.
330	Wm. T. Wallace Mfg. Co., Inc., Peru, Ind.
331	Ward Products Corporation, Division of the Gabriel Company, Cleveland 15, Ohio
332	*Warwick Manufacturing Corporation, Chicago 44, Ill.
334	Wells-Gardner & Co., Chicago 39, Ill.
335	Wm. H. Welsh Co., Inc., Chicago 16, Ill.
336	Western Electric Company, Inc., New York 5, N. Y.
337	Westinghouse Electric Corporation, Baltimore 3, Md.
338	Weston Electrical Instrument Corp., Newark 5, N. J.
339	*Wilcox Electric Company, Inc., Kansas City 27, Mo.
342	*The Zell Products Corp., Norwalk, Conn.
343	Zenith Radio Corporation, Chicago 39, Ill.
345	*The Astatic Corporation, Conneaut, Ohio
351	Symphonic Radio and Electronic Corp., Boston 14, Mass.
352	Magnetic Windings Division, Essex Wire Corporation, Easton, Penna.
356	*R. Prescott & Son, Inc., Keeseville, N. Y.
357	*Teleradio Engineering Corporation, Wilkes Barre, Pa.
360	*Gavitt Mfg. Co., Inc., Brookfield, Mass.
366	New York Transformer Co., Inc., Alpha, N. J.
367	National Moldite Company, Hillside 5, N. J.
368	*Santay Corporation, Chicago 24, Ill.
369	*Stoddart Aircraft Radio Co., Hollywood 38, Calif
370	*United-Carr Fastener Corporation, Cambridge 42, Mass.
371	*Best Manufacturing Co., Inc., Irvington 11, N. J.
372	*Holyoke Wire and Cable Corporation, Holyoke, Mass.
375	*Webster-Chicago Corporation, Chicago 39, Ill.
376	Hazeltine Electronics Corporation, Little Neck, L. I., N. Y.
380	*Radio Receptor Company, Inc., New York 11, N. Y.
382	Waters Conley Company, Rochester, Minn.
384	*Red Lion Cabinet Company, Red Lion, Pa.
385	*Dearborn Glass Company, Chicago 8, Ill.
391	Altec Lansing Corporation, Beverly Hills, Calif.
392	*The Wheeler Insulated Wire Company, Inc., Waterbury, 20, Conn.
394	*Foster Transformer Company, Cincinnati 23, Ohio
395	*Permoflux Corporation, Glendale 4, Calif.
396	General Cement Mfg. Co., Rockford, Ill.
397	Gabriel Electronics Division, The Gabriel Company, Norwood, Mass.
402	Andrew Corporation, Chicago 19, Ill.
406	Wirt Company, Philadelphia 44, Pa.
409	British Industries Corporation, New York 13, N. Y
411	Hardwick, Hindle, Inc., Newark 5, N. J.
412	*General Transformer Company, Homewood, Ill.
413	*Acme Electric Corporation, Cuba, N. Y.
418	*United Transformer Corporation, New York 13, N. Y.
423	North American Philips Company, Inc., New York 17, N. Y.
425	*Essex Electronics, Berkeley Heights, N. J.
427	Communication Measurements Laboratory, Inc., Plainfield, N. J.
430	Camburn, Inc., Woodside 77, N. Y.
431	Waterman Products Company, Inc., Philadelphia 25, Pa.
433	Cleveland Electronics, Inc., Cleveland 3, Ohio
435	*Plastoid Corporation, Hamburg, N. J.
437	*Newcomb Audio Products Company, Hollywood 38, Calif.
438	The Gudeman Company, Chicago 10, Ill.
440	Cannon Electric Company, Los Angeles 31, Calif.
442	J-B-T Instruments, Inc., New Haven 8, Conn.
445	*Mississippi Products, Inc., Jackson, Miss.
446	Good-All Electric Mfg. Co., Ogallala, Nebr.
450	Columbus Process Co., Inc., Columbus, Ind.
452	*Empire Coil Company, Inc., New Rochelle, N. Y.
454	Telequip Radio Company, Chicago 8, Ill.
456	*Fisher Radio Corporation, Long Island City 1, N. Y.
457	Herlec Corporation, Sub. of Sprague Electric Co., Grafton, Wis.
459	*General Communication Company, Boston 15, Mass.
461	Barker & Williamson, Inc., Upper Darby, Pa.
464	*Q. L. C. Corporation, Summit, N. J.
465	Oxford Electric Corporation, Chicago 15, Ill.
466	Delco Radio Division, General Motors Corporation Kokomo, Ind.
467	Grigsby-Allison Company, Inc., Arlington Heights, Ill
472	*Pyramid Electric Company, North Bergen, N. J.
474	Special Products Company, Silver Spring, Md.
475	*Glass Products Company, Chicago 37, Ill.
481	Harnett Electric Corporation, Port Washington, N. Y.
482	Rada Products Co., Chicago 12, Ill.
484	*Shurite Meters (J-B-T Instruments, Inc.), New Haven 8, Conn.
487	*Hudson Electronics Corporation, Mount Vernon, N. Y.
489	*Radio Television Products Corp., Grass Lake, Mich.
494	Fidelity Products Co., Inc., So. Orange, N. J.
501	Standard Piezo Company, Carlisle, Pa.
503	Caledonia Electronics & Transformer Corp., Caledonia, N. Y.
504	The James Knights Company, Sandwich, Ill.
505	Precision Apparatus Company, Inc., Elmhurst, L. I., N. Y.
507	John Volkert Metal Stampings, Inc., Queens Village 29, Long Island, N. Y.
508	The Hickok Electrical Instrument Co., Cleveland 8, O.
514	*Audio Electric Company, Chicago 26, Ill.
515	*Electronic Components Corporation, Chicago 8, Ill.
516	United Condenser Corporation, New York 54, N. Y.
517	Audak Company, Inc., New York 18, N. Y.
518	*Sampson Electric Products Co., Clinton, N. C.
520	Schneider & Marquard, Inc., Brooklyn 17, N. Y.
524	*Triwec Transformer Company, Chicago 18, Ill.
525	Crucible Steel Company of America, New York 17, N. Y.
527	Valpey Crystal Corporation, Holliston, Mass.
529	Wheeler Laboratories, Inc., Great Neck, N. Y.
530	Clippard Instrument Laboratory, Inc., Cincinnati 31, Ohio
532	*Ward Leonard Electric Co., Mount Vernon, N. Y.
535	Hedco Manufacturing Corporation, Chicago 10, Ill.
536	Tel-Instrument Co., Inc., Carlstadt, N. J.
538	*Pyroferric Company, New York 67, N. Y.
539	The Yale & Towne Manufacturing Co., Powdered Metal Products Division, Franklin Park, Ill.
540	*Radio Industries, Inc., Chicago 40, Ill.
541	Industrial Television, Inc., Clifton, N. J.
547	*Anaconda Wire & Cable Company, Hastings-On-Hudson 6, N. Y.
548	*B. J. Toegel, Inc., Plainfield, N. J.
549	*Mid-West Coil & Transformer Co., Chicago 14, Ill.
550	*Standard Winding Company, Newburgh, N. Y.
551	American Television & Radio Co., St. Paul 1, Minn.
552	Otis Radio & Electric Corp., Hawarden, Iowa
553	*Wesco Electric Company, Inc., Chicago 31, Ill.
554	American Phenolic Corporation, Chicago 50, Ill.
555	*Waldom Electronics, Inc., Chicago 10, Ill.
556	*Halldorson Transformer Company, Chicago 40, Ill.
557	Electronic Products Company, Mt. Vernon, N. Y.
559	Lyman Electronic Corporation, Springfield, Mass.
562	Polarad Electronics Corporation, Brooklyn 11, N. Y.
563	J. W. Davis & Company, Dallas 9, Texas
569	*Electrical Utilities Company, La Salle, Ill.
570	*Leonard Electric Products Co., Inc., Brooklyn 32, N. Y.
571	General Cable Corporation, Perth Amboy, N. J.
572	*F. & V. Coil Winding Corporation, Newark 5, N. J.
573	Alcon Metal Products, Inc., Chicago 47, Ill.
574	*Stanwyck Winding Company, Newburgh, New York
575	*Heppner Manufacturing Company, Round Lake, Ill.
577	*LaPointe Electronics Inc., Rockville, Conn.
579	Belden Manufacturing Company, Chicago 44, Ill.
580	*Rowe Industries, Toledo 9, Ohio
581	*Aircraft-Marine Products, Inc., Harrisburg, Pa.
583	Tele King Corporation, New York 1, N. Y.
584	W. M. C. Inc., Chicago 47, Ill.
585	*American Insulator Corp., New Freedom, Penna.
586	Drake Manufacturing Company, Chicago 22, Ill.
587	Radio Specialty Manufacturing Co., Portland 14, Ore.
588	Barnes Metal Products Company, Chicago 23, Ill.
589	David Bogen Co., Inc., New York 14, N. Y.
590	Shure Brothers, Inc., Chicago 10, Ill.
592	Perfection Electric Company, Chicago 16, Ill.
593	Kip Electronics Corporation, New York 14, N. Y.
594	*Kobzy Tool Company, Chicago 22, Ill.
596	Gramer Transformer Corporation, Chicago 39, Ill.

Code No.	Company
597	Stevens Wire Insulating Company, Chicago 39, Ill.
599	*Elco Corporation, Philadelphia 40, Pa.
603	*Eltran Corp., St. Anne, Ill.
604	The Staver Company Incorporated, Bay Shore, L. I.
606	Woodward-Schumacher Electric Corporation, Chicago 22, Ill.
607	Consolidated Wire & Associated Companies, Chicago 16, Ill.
608	*TELvision Laboratories, Inc., Wauconda, Ill.
609	Markel Electric Products, Inc., Buffalo 3, N. Y.
610	Carter Parts Company, Chicago 10, Ill.
614	Simpson Electric Company, Chicago 44, Ill.
616	Illinois Condenser Co., Chicago 22, Ill.
617	RAM Electronics, Inc., Irvington-On-Hudson, N. Y.
618	*TV Products Corporation, Paterson 3, N. J.
620	Kay Electric Company, Pine Brook, N. J.
623	Anchor Radio Corporation, Chicago 23, Ill.
624	Surprenant Mfg. Co., Boston 8, Mass.
628	*Davis Electric Company, Cape Girardeau, Mo.
631	Pickering and Company, Inc., Oceanside, N. Y.
632	*El-Rad Manufacturing Co., Chicago 18, Ill.
633	American Television, Inc., Chicago 5, Ill.
634	*Todd Products Co., Inc., Mt. Vernon, N. Y.
635	*Todd-Tran Corp., Mt. Vernon, N. Y.
636	*Sheldon Electric Company, Div. of Allied Electric Products, Inc., Irvington 11, N. J.
637	*Central Coil Company, Inc., Indianapolis 22, Ind.
638	Industrial Development Engineering Associates, Inc., Indianapolis 4, Ind.
639	Johnson & Hoffman Manufacturing Co., Mineola, N. Y.
642	Mycalex Corporation of America, Clifton, N. J.
643	National Aeronautical Corporation, Ambler, Pa.
644	General Railway Signal Company, Rochester 2, N. Y.
647	American Structural Products Co., Sub. of Owens-Illinois Glass Co., Toledo 1, Ohio
648	*American Radionic Co., Inc., Brooklyn 17, N. Y.
649	Electro-Voice, Inc., Buchanan, Michigan
653	Wind Turbine Company, West Chester, Pa.
654	Square Root Manufacturing Company, Yonkers 2, N. Y.
655	*J. A. Maurer, Inc., Long Island City 1, N. Y.
657	Lowell Manufacturing Company, St. Louis 17, Mo.
658	Sangamo Electric Company, Marion, Ill.
659	John R. Hollingsworth Corporation, Clifton Heights, Pa.
662	Weller Electric Corporation, Easton, Pa.
666	Winsted Division, Hudson Wire Company, Winsted, Conn.
668	*Standard Electrical Products Co., Dayton 3, Ohio
670	Glaser-Steers Corporation, Belleville 9, N. J.
671	Lytle Engineering & Mfg. Co., Chicago 3, Ill.
672	Thomas Electronics, Inc., Passaic, N. J.
674	Shoup Engineering Company, Chicago 4, Ill.
677	*Rogers Electronic Corp., New York 12, N. Y.
678	Rhode Island Insulated Wire Co., Inc., Cranston, R. I.
679	*Tech-Master Products Company, New York 13, N. Y.
680	Conrac, Incorporated, Glendora, Calif.
681	*American Lava Corporation, Chattanooga 5, Tenn.
682	*Electrical Windings, Inc., Chicago 39, Ill.
683	Wright Zimmerman, Inc., New Brighton, Minn.
684	*Sarkes Tarzian, Inc., Bloomington, Ind.
686	H. S. Martin & Company, Evanston, Ill.
687	*Hillburn Electronic Products Co., Brooklyn 22, N. Y.
688	*Trad Television Corporation, Asbury Park, N. J.
689	*Aladdin Radio Industries, Inc., Nashville, Tenn.
690	*Ticon Inc., Bridgeport, Conn.
692	CELCO (Constantine Engineering Laboratories Co.), Mahwah, N. J.
693	Multi-Tron Laboratory, Chicago 44, Ill.
694	Standard Electronics Corporation, Newark 5, N. J.
695	Basler Electric Company, Highland, Ill.
696	The Turner Company, Cedar Rapids, Ia.
697	*Phalo Plastics Corporation, Worcester 8, Mass.
698	Sheffco Manufacturing Co., Palisades Park, N. J.
699	Keystone Electronics Company, Stamford, Conn.
700	The Radion Corporation, Chicago 14, Ill.
701	Forbes & Wagner, Inc., Silver Creek, N. Y.
702	Radio Apparatus Corporation, Indianapolis 4, Ind.
703	Prodelin, Inc., Kearny, N. J.
704	Cosmic Radio Corporation, New York 59, N. Y.
705	*Ajax Condenser Co., Inc., Chicago 14, Ill.
706	Pioneer Electronics Corporation, Santa Monica, Calif.
707	*Anchor Electronics Inc., Union City, N. J.
708	Bell Sound Systems, Inc., Columbus 7, Ohio
710	*Standard Condenser Company, Chicago 47, Ill.
711	*Soreng Products Corporation, Schiller Park, Ill.
713	Taylor Tubes, Inc., Chicago 47, Ill.
715	Technology Instrument Corporation, Acton, Mass.
717	Arthur Ansley Manufacturing Co., Doylestown, Pa.
719	*Carbonneau Industries, Inc., Grand Rapids 4, Mich.
720	Methode Manufacturing Corp., Chicago 47, Ill.
721	*Rollan Electric Co., Chicago 19, Ill.
722	Milwaukee Resistor Co., Milwaukee 4, Wis.
723	Northwest Plastics, Inc., Saint Paul, Minn.
724	Jeffers Electronics Division, Speer Carbon Company, Dubois, Penna.
725	Copperweld Steel Company, Glassport, Pa.
726	Penn Television Products Co., Philadelphia 34, Pa.
729	*The American Woodworking Co., West Haven 16, Conn.
730	Jersey Specialty Co., Inc., Mountainview, N. J.
732	Radio Materials Corporation, Chicago 13, Ill.
733	Alpha Metals, Inc., Jersey City 4, N. J.
734	Fretco Incorporated, Pittsburgh 13, Penna.
735	*The Formatic Company, Naugatuck, Conn.
736	*Paul & Beekman, Inc., Philadelphia 40, Pa.
737	Technical Appliance Corporation, Sherburne, N. Y.
738	Lewis and Kaufman, Ltd., Los Gatos, Calif.
739	Oak Electronics Company, Buffalo 3, N. Y.
740	Olympic Metal Products Co., Inc., Alpha 1, N. J.
741	The Whitney Blake Company, New Haven 14, Conn.
742	*Esquire Radio Corporation, Brooklyn 19, N. Y.
744	Hughes Aircraft Company, Culver City, Calif.
745	*Tempel Manufacturing Company, Chicago 26, Ill.
746	L. H. Frost & Company, Grand Rapids 2, Mich.
748	*Russell Speaker Company, Chicago 29, Ill.
749	*National Electronics, Incorporated, Geneva, Ill.
750	Mosley Electronics, Incorporated, St. Louis 14, Mo.
752	Electronic Devices, Inc., Brooklyn 15, N. Y.
754	*Permaglass, Incorporated, Genoa, Ohio
756	Universal Company, High Point, N. C.
757	*Grand Transformers, Inc., Grand Haven, Mich.
758	*The Electrometric Co., Woodstock, Ill.
760	*Co-Operative Industries, Inc., Chester, N. J.
761	*Planet Manufacturing Corp., Bloomfield, N. J.
762	Erca Tool Die & Stamping Co., Brooklyn 22, N. Y.
763	Electronics & Nucleonics, Inc., New York 1, N. Y.
765	Videon Electronic Corporation, Indianapolis 4, Ind.
766	Haydon Products Corporation, Brooklyn 15, N. Y.
767	Quincy Speaker Manufacturing Corp., Quincy, Ill.
768	Crest Laboratories, Incorporated, Rockaway Beach 93, N. Y.
769	National Electric Products Corp., Pittsburgh 30, Pa.
770	Stone City Machine & Tool Co., Bedford, Ind.
771	Penta Laboratories, Inc., Santa Barbara, Calif.
773	*The Forest Electric Company, Forest Park, Ill.
774	Macon Electronics, Div. of York Radio & Television Corp., Decatur, Ill.
775	*Electro-Mechanical Products Corp., Riverhead, N. Y.
776	*Ogden Coil & Transformer Co., Chicago 12, Ill.
777	Laidman & Company, Chicago 22, Ill.
778	Rego Insulated Wire Co., Hoboken, N. J.
779	*Custom Parts Corporation, Mattituck, N. Y.
780	DeJur-Amsco Corporation, Long Island City, N. Y.
781	Vacuum Tube Products, Oceanside, Calif.
782	Spencer Kennedy Laboratories, Inc., Cambridge 39, Mass.
783	Eldico of New York, Inc., Douglaston, N. Y.
784	Johnson Electronics, Orlando, Fla.
785	*Worthco Corporation, Beverly Hills, Calif.
786	*Hinners-Galanek Radio Corporation, Long Island City 6, N. Y.
787	*Sonotone Corporation, Elmsford, N. Y.
788	Daystrom Electric Corporation, Poughkeepsie, N. Y.
789	McGregor Electronic Industries, Inc., McGregor, Ia.
791	Hopkins Engineering Company, Altadena 3, Calif.
792	Atlantic Wire & Cable Company, College Point 56, N. Y.
793	McIntosh Laboratory, Inc., Binghamton, N. Y.
794	Harmon-Kardon, Inc., New York 12, N. Y.
795	G & H Wood Products Company, Brooklyn 11, N. Y.
796	*Chicago Radionics Corporation, Chicago 14, Ill.
797	Vidaire Electronics Mfg. Co., Lynbrook, L. I.
798	*Supreme Transformer Corporation, Chicago 12, Ill.
799	*California Magnetic Control Corp., North Hollywood, Calif.
800	*Emerald Manufacturing Company, Chicago 30, Ill.
802	Tempo T-V Products Company, Los Angeles 47, Calif.
803	Microwave Associates, Inc., Boston 15, Mass.
804	*Union Electric & Manufacturing Co., Jersey City, N. J.
805	Morgan-Rhein, Inc., Orlando, Fla.
806	*Mark Electronics Inc., Newark 2, N. J.
807	*General Dry Batteries, Inc., Cleveland 7, O.
808	*Henald Manufacturing Co., St. Anne, Ill.
809	Varian Associates, Palo Alto, Calif.
810	Translite Electronics Corp., Chicago 39, Ill.
811	Continental Electronics Corp., Philadelphia 31, Penna.
812	*Bradley Laboratories, Inc., New Haven 11, Conn.
813	Adler Communications Laboratories, New Rochelle, N. Y.
814	Antenna & Mounting Hardware Co., Franklin Park, Ill.
815	San Fernando Electric Mfg. Co., San Fernando, Calif.
816	Dale Products, Inc., Columbus, Nebr.
817	Brubaker Manufacturing Company, Inc., Los Angeles 34, Calif.
818	*Tel-O-Tube Corporation of America, East Paterson, N. J.
819	Z & W Machine Products Inc., Cleveland 3, O.
820	*United Electronic Manufacturing Corp., Union City, N. J.
821	Universal Vacuum Tube Corp., Yonkers 2, N. Y.
822	*Syntronic Instruments, Inc., Addison, Ill.

Code No.	Company
824	*Videocraft Manufacturing Co., Chicago 39, Ill.
825	*Thermador Electrical Mfg. Co., Los Angeles 22, Calif.
827	*The Allen D. Cardwell Mfg. Corp., Plainville, Conn.
828	Midland Manufacturing Co., Inc., Kansas City 15, Kan.
829	Radell Corporation, Santurce 34, P. R.
830	*Triad Transformer Corporation, Venice, Calif.
831	*Better Coils, Inc., Goodland, Ind.
832	McCoy Electronics Co., Mt. Holly Springs, Penna.
833	Magnex Corporation, Jamaica 18, N. Y.
834	*Mel-Rain Corporation, Indianapolis 4, Ind.
835	*Ratel, Inc., Monrovia, Calif.
836	*National Video Corporation, Chicago 32, Ill.
837	*Carol Electronics Corporation, New York 10, N. Y.
838	*Carson Manufacturing Company, Indianapolis 18, Ind.
839	*Crest Transformer Corp., Chicago 22, Ill.
840	Orradio Industries, Inc., Opelika, Ala.
841	Central Sales & Manufacturing Corp., Denville, N. J.
842	The Tetrad Company, Yonkers 2, N. Y.
843	Klipsch & Associates, Hope, Ark.
844	Rectifier Corporation, Fajardo, Puerto Rico
845	International Rectifier Corporation, El Segundo, Calif.
846	Reiner Electronics Co., Inc., New York 1, N. Y.
847	University Loudspeakers, Inc., White Plains, N. Y.
848	Onondaga Pottery Company, Syracuse 1, N. Y.
849	*Fidelity Tube Corporation, East Newark, N. J.
850	Chromatic Television Laboratories, Inc., New York 36, N. Y.
851	R. L. Drake Company, Dayton 2, Ohio
852	Andrews Tower Company, Fort Worth 11, Tex.
853	Swett & Sibley Company, Cambridge 39, Mass.

Code No.	Company
854	T J Mfg. Corporation, Martinsville, Ind.
855	International Instruments Inc., New Haven 15, Conn.
856	Transistor Products, Inc., Boston 35, Mass.
857	*V-M Corporation, Benton Harbor, Mich.
858	*Royal Transformer Corporation, Chicago 30, Ill.
859	U M & F Manufacturing Corporation, North Hollywood, Calif.
860	Avionex Electronics Corporation, Burbank, Calif.
861	Don Good Inc., South Pasadena, Calif.
862	Cal-Tronics Corp., Los Angeles 45, Calif.
863	*James Vibrapowr Company, Chicago 18, Ill.
864	*Tel-Ray Tube Co., Inc., Yonkers, N. Y.
865	Davis Electronics Co., Burbank, Calif.
866	*Industrial Hardware Manufacturing Co., Inc., New York 12, N. Y.
867	C-B-C Electronics Co., Inc., Philadelphia 23, Penna.
868	Telechrome Incorporated, Amityville, N. Y.
869	Kline Iron and Metal Company, Columbia, S. C.
870	Cubic Corporation, San Diego 6, Calif.
871	Precision Electronics Inc., Franklin Park, Ill.
872	Saffran & Arnold Electronics, Toledo, Ohio
873	*Resistance Products Company, Harrisburg, Penna.
874	Tristao Manufacturing Company, Kansas City 6, Mo.
875	Kay-Townes Antenna Company, Rome, Ga.
876	Phen-O-Tron, Inc., New Rochelle, N. Y.
877	Hydro-Aire, Inc., Sub. of Crane Co., Burbank, Calif.
878	Acro Products Company, Philadelphia 28, Penna.
879	Litton Industries, Los Angeles 64, Calif.
880	Thomas Associates, Los Angeles 38, Calif.

The PHOTOFACT Servicer

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FIRST COLOR TELEVISION PHOTOFACT FOLDER

This Set of Folders (Set 252) contains the first PHOTOFACT coverage of a color television receiver. Folder No. 11 contains service data on the RCA VICTOR Model CT-100.

Future PHOTOFACT Folder Sets will include service data on other color television receivers as they become available. We are currently analyzing and compiling PHOTOFACT service data on several color receivers. The PHOTOFACT service data on these and future color receivers will be available only as part of the complete set of folders in which they are contained.

Our objective is to provide you with service information you need; data that will help you do your job better, faster and easier. Improvements have been made and new features have been added continuously to PHOTOFACT Folders with this thought in mind.

The following description of portions of the contents of the color TV PHOTOFACT Folder points out features which we feel are important to you.

1. Your Color TV PHOTOFACT Folder is supplied with a jacket. This jacket is the same as supplied with Black and White (Monochrome) TV Folders, differing only in color so that it can be readily identified. It is punched to fit the standard binder. The entire contents are readily removable. Contents are not bound, making it possible to refer to several pages of the information at one time.

2. The Table of Contents on Page 1 provide a quick reference to desired information. An identifying cabinet photograph also appears on this page.

3. Scope waveforms taken at various points throughout the receiver are shown on Page 3. Waveforms are keyed to the test points in the receiver by W numbers which appear on the schematic diagram. Applicable notes as to type of signal input, control settings, and special precautions are included with the waveforms. This page can be placed alongside the schematic for quick reference and maximum useability.

4. Complete alignment instructions in the easy-to-use, step-by-step form are given on Pages 5 thru 9. Adjustments and instrument connection points are keyed to the schematic diagram and various photographs.

5. Photographs with item numbers, and alignment callouts keyed to Parts List and schematic diagram.

6. Complete Resistance Chart.

7. Disassembly Instructions.

8. Tube Placement Chart (bottom view) shown as the chassis would be on your bench.

9. Tube Placement Chart (top view) as the chassis appears in the cabinet. Locating lugs and blank pins identified for use in replacing tubes. Fuse placement and circuits protected. Sound and sync take-off points indicated.

10. Front and rear panel service adjustment locations.

11. Complete Parts List on Pages 27 thru 33.

12. Tuner Schematic on Page 34.

13. Three pages (15, 16 and 17) of special adjustments and set-up procedure. Included are: (a) Horizontal Sweep Circuit Adjustments, (b) High Voltage Adjustment and Performance Check, (c) Color AFC Alignment, (d) Horizontal and Vertical Dynamic Convergence, (e) Matrix Alignment, (f) Centering, (g) Width, (h) Linearity, (i) DC Convergence.

14. Block Diagram on Page 35 showing functions of various units.

15. A 4-page PHOTOFACT Standard Notation Schematic. Voltage measurements shown throughout at tube pins, various test points and voltage distribution lines. Arrangement and Layout providing maximum ease of use.

FIELD EXPERIENCES

For every "Field Experience" published, we issue a certificate good for one PHOTOFACT Folder Set. Awards are issued at the time of publication. Since it is impossible to verify the accuracy of contributions, we cannot be responsible for either the diagnosis made of the receiver trouble, or the results which will be obtained by following the suggested repair routine. All contributions become the property of Howard W. Sams & Co., Inc.

Westinghouse Model H-626T16
Photofact Set 116, Folder 13

Complaint: Intermittent sound and picture. Raster OK.

Analysis and Repair: V12 (AGC Amplifier) was shorting. Replaced V12. This is a 6AU6 in early productions and 6BJ6 in later productions.

Richard A. Todd
1850 South Street
Portsmouth, Va.

Mercury Model 4120
Photofact Set 172, Folder 6

Complaint: Insufficient width and height. Horizontal drive lines at right and left side of screen. Severe foldover on left side.

Analysis and Repair: Capacitor C80 (.03MFD) shorted and T3 Horizontal Output Transformer burned out between terminals 3 and 4. Replaced both units (C80 and T3).

Fred Loewy
Ace Radio Television Service
237 E. Washington Street or
19 South 3rd Street
Phoenix, Arizona

Emerson Model 721D
Photofact Set 197, Folder 5

Complaint: Narrow picture and slight distrotion in sound.

Analysis: Voltage analysis showed low voltages throughout the set. Picture was clear and vertical linearity and height OK. A resistance check on the Horizontal Output Transformer (T2) revealed an open between terminals 2 and 3.

Repair: Replaced transformer (T2) and set was restored to normal operation.

C. E. Allen
Beacon TV & Radio
Box 1433
Levelland, Texas

Dumont Models RA-166,
RA-167, RA-170, RA-171
Photofact Set 216, Folder 2

Complaint: Loss of picture and decrease in sound output after about an hour of operation. Turning DuMonitor AGC Control may bring picture back for a short time.

Analysis: It was found that the filament choke L21 increased in resistance until heater voltage on V4 and V5 was less than 4 volts.

Repair: Replace L21.

Ken Churchill
Cass City, Oil & Gas Co.
Cass City, Michigan

Admiral Chassis 19C1
Photofact Set 210, Folder 2

Complaint: Picture rolls up slowly after set has been in operation and warmed up. Increased speed of roll as set gets warmer.

Analysis and Repair: C51 (470MMF) coupling capacitor changing in value. Replaced capacitor.

Roy T. Mosely
Universal TV & Radio Service
901 North Callow Avenue
Bremerton, Washington

Admiral Chassis 20A1
Photofact Set 77, Folder 1

Complaint: Unable to focus picture.

Analysis and Repair: Check of the focus control and focus coil indicated they were both OK. Voltage analysis indicated low current through focus control. Examination of schematic revealed possibility of tubes V26 or V27. A check showed V27 to be weak. Replacing V27 restored set to normal operation.

Admiral Chassis 20A1
Photofact Set 77, Folder 1

Complaint: Intermittent picture.

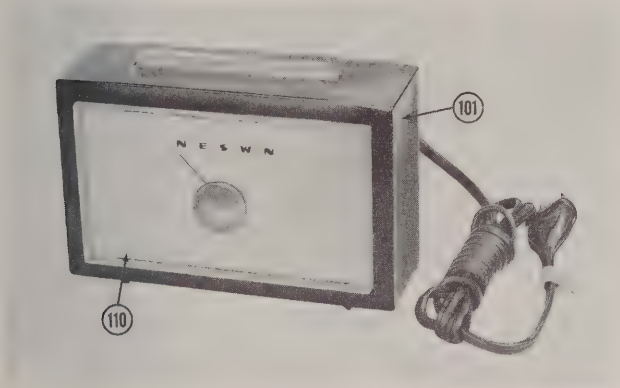
Analysis and Repair: Heat treatment and numerous tests finally isolated trouble to the AGC amplifier stage. Voltage check and tracing of wiring led to rosin joint at terminal strip where lead from plate connects to feedback capacitor C65. Resolder connection.

Editor's Note: Both above field experiences were contributed by-

Grady Matthews
1541 N. Marhall
Milwaukee, Wisconsin

The PHOTOFACT Servicer

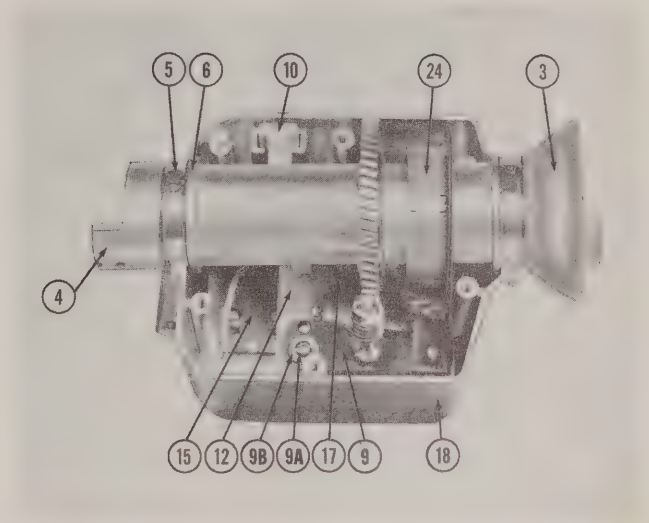
Vol. 26, Nos. 253 & 254 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ July 15, 1954

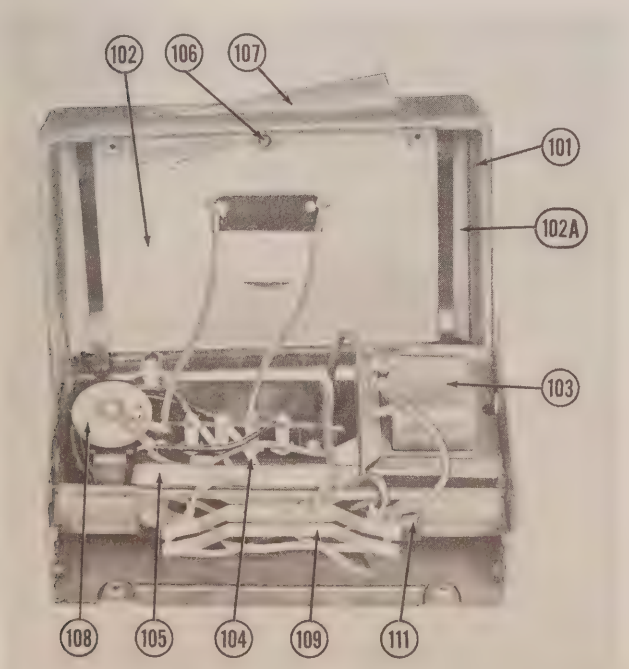


The following information on the Alliance Tenna-Rotor Model T10 is presented through the courtesy of Alliance Manufacturing Co., Alliance, Ohio.

GENERAL INFORMATION

The Alliance Tenna-Rotor Model T-10 is actuated by depressing the right or left end of the bar switch located on top of the control box. Depressing the right end rotates the antenna clockwise and depressing the left end rotates the antenna counter-clockwise. The antenna direction is registered on a direction indicator, located on the front of the control case. The direction indicator is actually a voltmeter which measures the voltage across a potentiometer mounted in the rotator unit. Rotating the antenna varies the voltage across the potentiometer causing the meter to register. The unit can be identified by the red neoprene weather shield and the new style rotator housing. This unit operates at a speed of two RPM and a motor brake has been included to prevent drifting and windmilling.





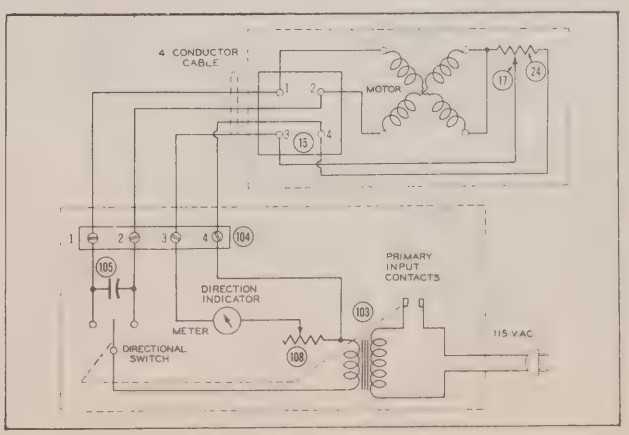
SERVICING PROCEDURE

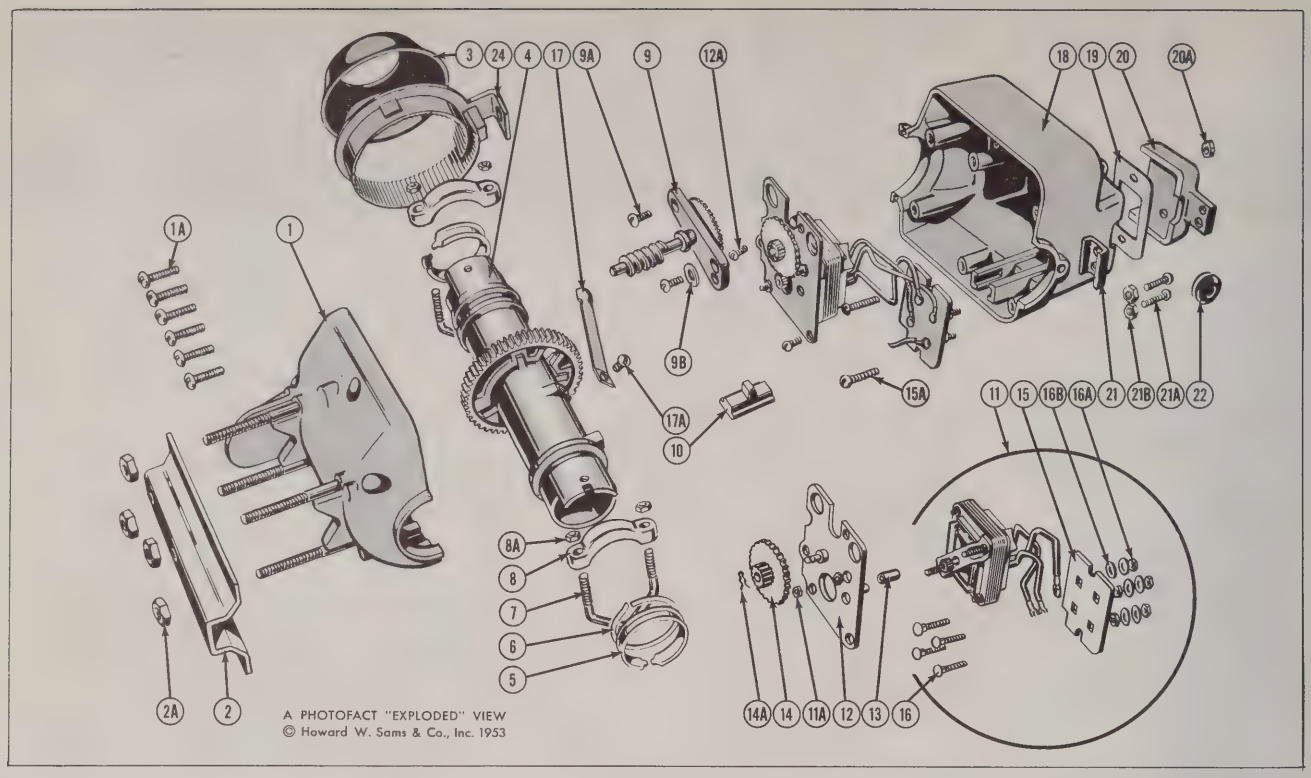
Power-off Checks-

1. Be sure that four-conductor cable is connected to proper terminals. Terminal No. 1 in the rotator should be connected to terminal No. 1 on the control box, and so on with No's. 2, 3, and 4.

2. Hollow shaft (Item #4) must have "play".

3. Primary input contacts (Item #109) within the control box should make solid contact for left and





right positions, and should have approximately 1/16 inch clearance in open position.

Power-on Check-

1. Line voltage should be approximately 115 volts.

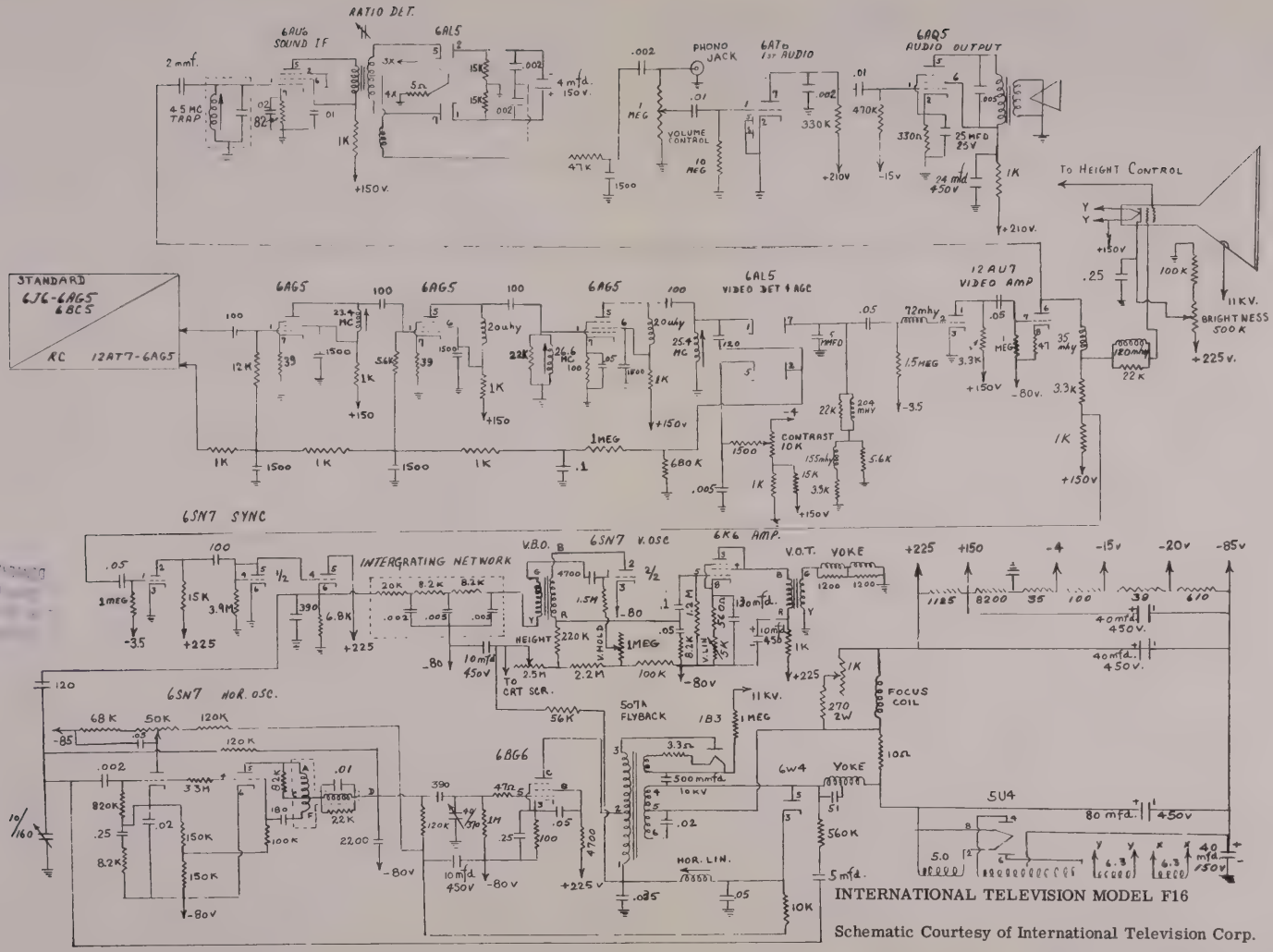
2. Run unit to counter-clockwise stop by depressing left end of control bar (Item #107). Indicator pointer should decrease steadily, stopping at the left side of the dial when the rotator reaches the counter-clockwise stop.

3. Run unit to clockwise stop by depressing right end of control bar. Indicator pointer should increase steadily, stopping at the extreme right end of the dial when the rotator reaches the clockwise stop.

4. Adjust calibrating rheostat (Item #108) for full-scale north reading, when unit is at full clockwise stop.

PARTS LIST

ITEM	NAME	PART No.	ITEM	NAME	PART No.
	Rotator Assembly	Z-5460-R	16B	Washer	#8
1	Housing Assembly, RH	Y-5454-R	17	Contact Spring	X-3967-A
1A	Housing Screws	10-32x3/4	17A	Screw, RHM	6-32x1/4
2	Clamping Plate	X-5456-A	18	Housing Assembly, LH	Z-5326-B
2A	Nuts, Hex	1/4x20	19	Gasket	X-5449-A
3	Weather Shield	X-3375-B	20	Terminal Cover	Y-5327-A
4	Shaft Assembly	Y-5463-S	20A	Nut	8-32
5	Bearing Collar	X-3987-A	21	Strain Relief Clamp	X-3380-A
6	Thrust Washer	X-3376-A	21B	Nut, Hex	6-32
7	U-Bolt	X-3377-A	22	Grommet	X-11-D
8	Mast Clamp	X-3319-A	24	Potentiometer	Y-3960-S
8A	Nut, Hex	10-32			
9	Worm Assembly	Y-5462-R		Control Box Complete	Z-5491-R
9A	Screw, RHM	8-32x3/8	101	Case	Z-5481-A
9B	Washer	#8	102	Meter Assembly	Z-5352-R
10	Stop Slide	X-3320-A	102A	Retainer	X-5495-A
11	Motor & Term Assembly	Y-5461-S	103	Transformer	Y-5357-R
11A	Nut, Hex	6-32	104	Terminal Strip Assembly	X-3803-S
12	Mounting Plate Assembly	X-4263-R	105	Capacitor	X-4098-A
12A	Screw, RHM	8-32x3/8	106	Pivot Pin	X-5355-A
13	Spacers	X-4141-A	107	Control Bar	X-5484-A
14	Gear & Pinion Assembly	X-3373-R	108	Calibrating Resistor	X-4094-B
15	Terminal Plate	X-4253-A	109	Switch Assembly	X-5346-R
15A	Screw, RHM	8-32x1	110	Window	Y-5485-A
16	Bolt, Carriage	8-32x5/8	111	Insulating Strip	X-5351-A
16A	Nut, Hex	8-32			



INTERNATIONAL TELEVISION MODEL F16

Schematic Courtesy of International Television Corp.

The PHOTOFACT Servicer

Vol. 20, Nos. 306 & 308 ★ Published for all users of Howard W. Sams' Photofact Folders ★ December 15, 1965

The service information in this Servicer provides data on models which we have been unable to present in PHOTOFACT Folders. The receivers are not in current production; a requirement for PHOTOFACT coverage, and we are therefore presenting schematics that will be of assistance when servicing these models.

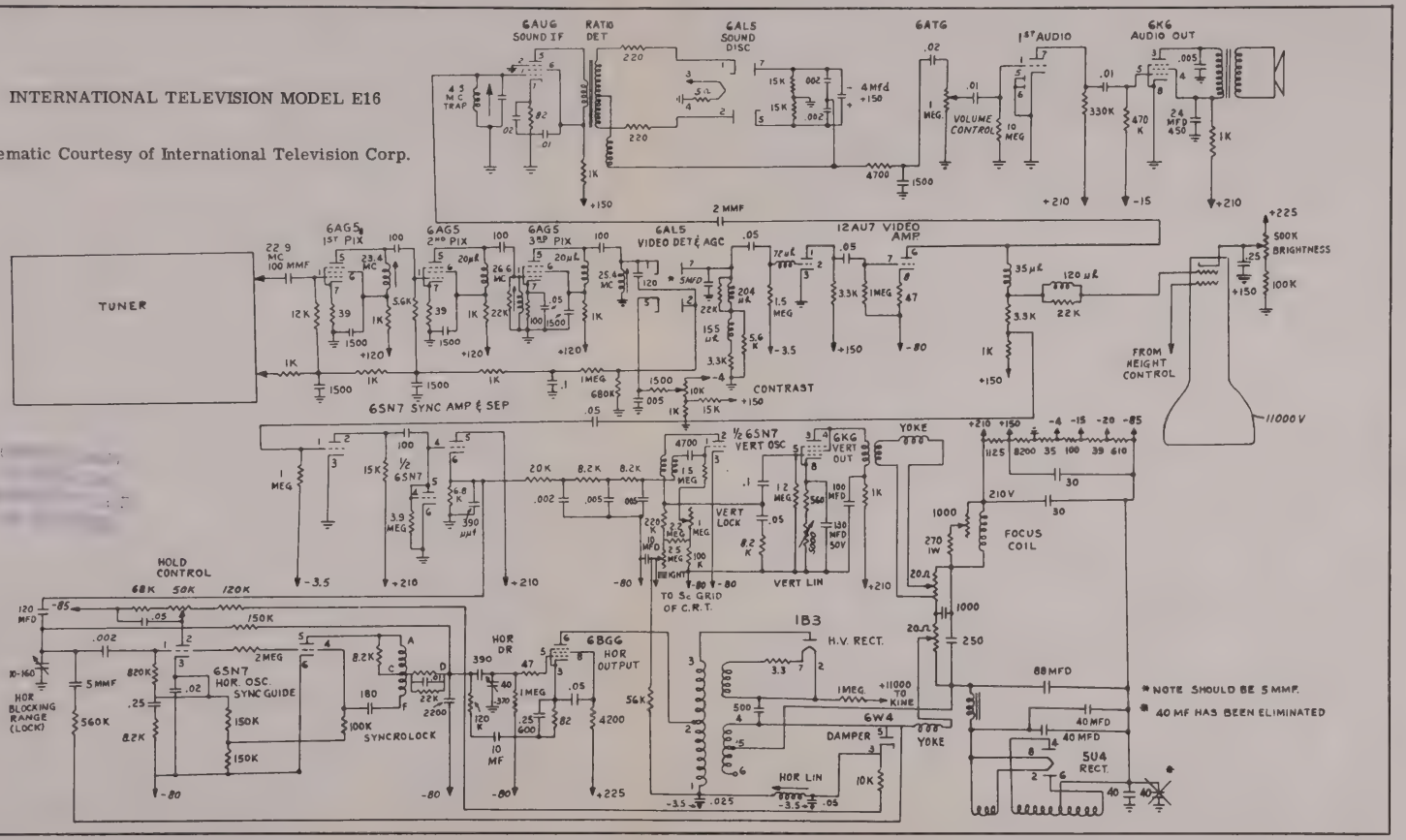
INTERNATIONAL TELEVISION

Model E16 — Main schematic shown below. Tuner schematic not available.

Model F16 — Main schematic shown on reverse side. Tuner schematic not available.

INTERNATIONAL TELEVISION MODEL E16

Schematic Courtesy of International Television Corp.



The PHOTOFACT Servicer

Vol. 23, Nos. 223 & 224 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ November 1, 1953

SERVICE HINTS

The following service hints covering DuMont television receivers are brought to you through the courtesy of Allen B. DuMont Laboratories, Inc., Paterson, New Jersey. Originally published in the DuMont Service News.

TROUBLESHOOTING HINTS

Models RA-166, RA-167, RA-168,
RA-169, RA-170, RA-171
Photofact Set 216, Folder 2

Symptom: One or more light vertical lines on right side of the picture.

Probable Fault: Horizontal drive and/or linearity controls are misadjusted.

Symptom: On strong signals picture rolls at low contrast control settings. On weak signals the picture jumps and jitters regardless of the control setting.

Probable Fault: V16, 12AU7, the sync-clipper tube, is defective.

(Prior to Run 4)

Symptom: Under extreme fringe operation, optimum sound and picture do not coincide.

Probable Fault: Low IF sound carrier.

Remedy: Tune set for optimum picture. Carefully adjust A6, the mixer plate coil, for best sound. If necessary, a further improvement may be obtained by a slight readjustment of the 3rd video IF transformer, L22.

Symptom: The high voltage fuse, M1, blows repeatedly when the set is turned on. Removal of the horizontal deflection-amplifier tube, V22, and the damper tube, V23, does not stop the fuse from blowing.

Probable Fault: C106, the 5000MMF capacitor in the damper circuit, is shorted.

Symptom: Audio howl.

Probable Fault: C65, the 10MMF capacitor connected between the plate of the sound IF, V12, and ground, is dressed too close to the tube socket.

Remedy: Dress the capacitor and its leads as far away from the socket of V12 as possible.

Symptom: Several horizontal bars in the picture. The intensity of the bars varies with the setting of the contrast control and is greatest at maximum setting. The AGC voltage at the chassis test point and the tuner IF amplifier is normal.

Probable Fault: C39, the .01MFD capacitor in the AGC line, is open or has lost capacitance, causing the AGC amplifier to oscillate.

Symptom: Several horizontal bars in the picture accompanied by excessive picture noise. The intensity of the bars varies with the setting of the contrast control and is strongest at the control's maximum. No AGC voltage is present at the chassis test point and the AGC voltage present at the tuner RF amplifier is excessive.

Probable Fault: Shorted capacitor in the video IF AGC line. Check C41, C44 and C47 for possible short.

Symptom: No picture, distorted sound. Wide dark horizontal bars in a flashing raster. Readjustment of contrast control stops the raster flashing and a faint hum bar is visible at low brightness setting.

Probable Fault: L29, in the grid circuit of the video amplifier, V9, is open or intermittent.

(Tuners 89 012 901 or 89 012 911)

Symptom: Loss of high VHF channels. Low band VHF stations are weak. Substitution of tuner tubes has no effect. The voltage at the plate of the tuner oscillator, pin 1 of V3, is low.

Probable Fault: C28, the 10MMF 10% N750 capacitor in the tuner oscillator circuit, is leaky.

Remedy: Replace C28, Check R20, 4.7K oscillator plate resistor, for possible damage or value change.

Models RA-160, RA-162, RA-162B
Photofact Set 179, Folder 4

Symptom: Repeated loss of horizontal hold. After adjustment hold is OK for several days.

Probable Fault: R129, 620K, 1W resistor in the horizontal oscillator circuit is changing value.

Symptom: Christmas tree effect. Turning the frequency slug of the horizontal oscillator transformer, (L36), inward, removes the Christmas tree effect and gives a locked-in picture; however, the high voltage drops below normal.

Probable Fault: C104, the 680MMF capacitor in the input to the horizontal sweep amplifier, has lost capacitance.

Symptom: Insufficient horizontal size. Deflection circuit checks OK. Substitute yoke gives correct horizontal size.

Probable Fault: The 68MMF, 5%, 1600V yoke damping capacitor, is leaky.

Symptom: Loss of horizontal size. Components in the horizontal sweep circuit check OK.

Probable Fault: The series resistance of C5, the 4MFD cathode-bypass capacitor in the horizontal amplifier has increased, causing degeneration which results in a reduction in horizontal-sweep amplitude.

Remedy: Replace C5, with DuMont part number 03 013 670 or 03 122 480.

Symptom: Very slight foldover, loss of brightness.

Probable Falut: R147, R148, R149 and R150, 470K, 2W resistors in the high voltage rectifier circuit, have increased in value.

Symptom: Gradual decrease in horizontal size as set warms up. Accompanied by increasing compression at the right side of the picture.

Probable Fault: R136 and/or R137, 220Ω, 2W resistors in the cathode circuit of V20, are increasing in value.

Symptom: Pronounced compression of foldover visible on the right side of the picture.

Probable Fault: C105, the 390MMF input capacitor to V20 or C106, the .25MFD screen bypass capacitor of V20, is leaky.

Symptom: Picture disappears a few seconds after set is turned on. Readjusting the AGC control results in an extremely dark picture. In some cases readjustment of the AGC will result in only a momentary appearance of the picture.

Probable Fault: C59, the .01MFD coupling capacitor to the cathode of V9, is leaky.

Symptom: Poor vertical sync. AGC critical.

Probable Fault: Open peaking coil, L30 in plate circuit of the video amplifier.

Models RA-164, RA-165
Photofact Set 189, Folder 7

Symptom: Intermittent 60-cycle hum in sound.

Probable Fault: C3D, the 40MFD cathode bypass capacitor of the audio amplifier, V11, is defective.

Symptom: Gradual increase in picture contrast as set operates.

Probable Fault: C3D, the 40MFD cathode bypass capacitor of the audio amplifier, V11, is leaky.

Symptom: Picture overload. Very little AGC voltage at the grid of the first video IF stage, V3. The negative voltage at the plate of V7, the AGC amplifier, is high.

Probable Fault: C18, the 120MMF tuner output capacitor is leaky.

Symptom: No sound, no picture. Burning odor. R15 connecting to the tuner blue lead is charred.

Probable Fault: 1000MMF tuner feed-through capacitor to the RF amplifier is shorted.

Remedy: Replace R15 and capacitor.

(Tuners 21010 781 - 82 or 83)

Symptom: No sound or picture on several of the high channels, usually channel 9 and higher. Low channels OK.

Probable Fault: C15, the 5MMF capacitor in the oscillator circuit is open.

Models RA-164, RA-165
Photofact Set 189, Folder 7
Models RA-166, RA-167, RA-168,
RA-169, RA-170, RA-171
Photofact Set 216, Folder 2

Symptom: Picture does not stay in sync over the complete range of the horizontal hold control. Readjustment of the horizontal stabilizer, L41 in the RA-166/171 or L23 in RA-164/165, does not help.

Probable Fault: The 6AL5 horizontal AFC is defective, or one of the 100K resistors in the AFC circuit has changed value. These resistors are R91, R92 in the RA-164/165 and R119, R120 in the RA-166/171.

Remedy: Check the 6AL5 horizontal AFC by substitution and/or replace the 100K resistors. Replacements should be matched within 10%.

Symptom: Picture drifts out of vertical synd. Hold control can be readjusted to lock in the picture for a short time. The vertical hold range gradually shifts toward the counterclockwise end of the control as the condition becomes progressively worse.

Probable Fault: The .01MFD, 1KV, capacitor in the vertical deflection-amplifier circuit, is leaky. This capacitor is C89 in the RA-166/171 and C58 in the RA-164/165.

Symptom: Intermittent loss of horizontal sync.

Probable Fault: The horizontal stabilizer coil is shorting intermittently. This coil is L23 in the RA-164/165 and L41 in the RA-166/171.

Symptom: 60 cycle sinusoidal ripple at edges of the raster.

Probable Fault: Heater-cathode leakage in the 6BQ6-GT horizontal-sweep amplifier.

Symptom: Bright horizontal line bouncing vertically accompanied by momentary pictures which are flashing on and off.

Probable Fault: The 10000MMF 1KV capacitor in the vertical multivibrator circuit is leaky or shorted. This capacitor is C89 in RA-166/171 and C58 in RA-164/165.

The PHOTOFACT Servicer

Vol. 21, Nos. 207 & 208 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ May 15, 1953

NEW PHOTOFACT WAVEFORM

Commencing in Set #210 an additional waveform is to be included on Photofact television schematics; namely, the waveform at the output of the vertical integrator network with the vertical oscillator tube removed. We will continue, as in the past, to also show the waveform obtained with the vertical oscillator tube operating. We feel this will be of great assistance when servicing this particular circuit and we wish to thank George Sorensen of Acme Radio & TV Service, Albany, California for submitting the suggestion to add this feature.

CORRECTION NOTICE

Photofact Set 199, Folder 13

All references to Sylvania Model C32M should be changed to read Model C33M.

CODE OF ETHICS

The Service Division, Electric League of Indianapolis, recently adopted a "Code of Ethics" in regard to Radio & Television Servicing. We feel other Service Organizations will find it interesting and worthy of consideration, since similar codes are being adopted by service technicians and associations throughout the Industry.

Each Member Agrees to:

1. Employ qualified personnel to insure proper service. No student shall be passed off as a technician.
2. Make proper arrangements for the protection of reserve funds on contracts.
3. Carry adequate insurance coverage.
4. Avoid trick advertising which offers to service or deliver material under conditions which are questionable or unfair to the set owner or our fellow members.
5. Employ approved methods of doing installations and maintenance.
6. Issue a standard guarantee.
7. Have available sufficient and proper test equipment to assure a good job.
8. Maintain an adequate service data library.
9. Whenever possible, render service no later than 24 hours.
10. Install only such parts and tubes as are really necessary. Use only new parts and tubes of a quality at least equal to original equipment.
11. Leave with or return to customer all tubes and parts replaced (except where impractical).
12. Issue an itemized bill.
13. Give estimate before major work is performed.
14. Service sets in home whenever possible.
15. Be honest, courteous, and treat each client in a professional manner.
16. Observe the Golden Rule.

* * *

FIELD EXPERIENCES

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DuMont RA-112-A3
Photofact Set 119, Folder 5

Complaint: Picture slides from side to side in an irregular manner, sometimes actually tearing out. Condition intermittent.

Analysis: C103 (.05 mfd. filter from arm of horizontal hold control to B-) found to be leaky.

William Kelvin
Kelco Electronics
120 Hilldale Road
Albertson, L. I., N. Y.

Hallicrafters Models 812, 818, 822
Photofact Set 124, Folder 6

Complaint: Little or no high voltage.

Cause & Remedy: After spending some time interchanging tubes and checking the circuit, I found the width coil at fault. Although it checks okay on ohmmeter, it shorts out on load. emoving the lead from one side of the width coil brings in raster. Replace width coil or leave off for temporary repair.

Mac Kellman
305 Farfield Place
Brooklyn 15, New York

* * *

Majestic Model 160A
Photofact Set 127, Folder 7

Complaint: Poor Sync and Horizontal Phase Displacement.

Remedy: Upon replacing weak sync tube V12 (6SN7 or 12AU7) the raster faded out as the new tube warmed up. Capacitor C43 (.05 @ 400V) was found shorted causing R58 to overheat. The shorted capacitor resulted in reducing the voltage on the picture tube grid which caused the pix tube to blank out and eventually resulted in burning out or weakening the sync tube due to the excessive current drain. Replacement of C43, R58 & V12 restored receiver to normal operation.

Mr. John Allen DeFrees
Triangle Appliance Service
New York

* * *

Sylvania Model 6120M
Photofact Set 124, Folder 10

Complaint: Vertical rolling for 5 to 10 minutes after set is turned on. Vertical hold control had to be fully clockwise.

Remedy: Capacitor (Item C85) found to be open. Capacitor was replaced and vertical hold operated normally.

Harry E. Hunter
44 Bushnell Avenue
Hunter's Radio Service
Oakville, Connecticut

* * *

Zenith Model H-401 (Ch. 4H40)
Photofact Set 156, Folder 15

Complaint: Low volume and distortion when used on the AC line.

Cause and Remedy: All tubes were tested and found to be all right. Further test of voltages showed that filaments were low and voltage supplied from 40 mfd. side of voltage divider R11 (22K) showed to be about 40 volts low. Since this low voltage supplied potentials to all tubes, the reduced plate currents resulted in the low filament voltages. All components such as rectifiers, capacitors, and resistors were checked and found to be all right. A study of the schematic revealed that R11 (22K) was paralled with R13 (680 ohm) through contacts on switch M3 when the portable is operated off of the line.

The trouble was found to be caused by dirt accumulating on the switch contacts which left only the 22K in the circuit. Cleaning this switch with carbon tetrachloride restored this set to normal.

Mr. Jack Glick
3832 Pall Mall Rd.
Baltimore, Maryland

* * *

The following service hint is not for any particular receiver, however, it could be very helpful in any case where a receiver employs a series filament string.

I had a television receiver recently which had an intermittent filament in a series-filament arrangement. With 11 tubes in this series string, it was a job to find out which one was causing the trouble. This set would play for hours on end and then, at some odd hour, when I stepped out on a service call, the set would act up, and maybe start working again just before I returned. The fellow who works with me is a salesman and not a technical man, so he was of little help.

I decided that I was going to make it possible for whoever happened to be around when this set acted up to tell me which tube had the intermittent filament. So I took a box of small neon bulbs, which I had around, and soldered small lengths of stiff hookup wire to them. Then I put the chassis on its side and soldered a neon bulb across each filament in the string (working on the theory that whichever filament opened up would have 110 volts potential across it).

I informed all around the store to keep a lookout on the set and let me know which bulb glowed when the set quit working. Two days later I left on a service call and had just driven away when the set quit. When I got back my salesman told me which bulb had lit up and it was a simple matter to replace the tube which the glowing neon bulb had shown to be defective.

Mr. Marvin Miller
Miller's Television Service
3136 W. Main Street
Springfield, Ohio

* * *

The following Service Hint was submitted by Firestone Service Department.

4-A110 Clock Radio

Complaint: Slumber switch does not work.

Cause: Chassis mounted too far forward in cabinet and interfering with slumber switch gear. Usually this complaint arises after radio has been in repair shop.

Remedy: Serviceman should take precautions in reinstalling chassis in cabinet for correct positioning.

Future production will have a block installed in front of cabinet to prevent chassis from interfering with gear.

The PHOTOFACT Servicer

Vol. 21, Nos. 215 & 216 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ August 15, 1953

NEW PRODUCTS

Merit Coil and Transformer Corp., Chicago, Illinois recently introduced ten new filament transformers for use with selenium rectifier applications.

The ten new Merit transformers cover the range of requirements for rectifiers used in industrial, laboratory, TV and power applications.

These units are in addition to the nine units already in the Merit line.

* * *

Littelfuse, Inc., Des Plaines, Illinois have revised their One Call Kit to represent latest useages of fuses as indicated by set manufacturers and service technicians.

* * *

Littelfuse, Inc., Des Plaines, Illinois has prepared a new and up-to-date TV Fuse Guide.

The new TV Fuse Guide is in booklet form and is perforated so that it can be hung on the wall conveniently and easily.

A copy may be obtained by contacting your Littelfuse jobber or writing directly to Littelfuse, Inc., 1865 Miner St., Des Plaines, Illinois.

* * *

Chicago Standard Transformer Corporation, Standard Division, have available their new catalogue of 24 pages giving electrical and physical specifications on almost 500 transformers. There are 25 new units listed, including 13 TV components and 5 transistor transformers.

The catalogue is available, without charge, from any Stancor Distributor or by writing direct to Chicago Standard Transformer Corporation, Standard Div., Elston and Addison, Chicago 18, Illinois.

* * *

NEW PARTICIPANT

The General Electric Company will become a participant in Photofact Folders starting with Set #216, listing replacement picture tubes and receiving tubes.

SELENIUM

Sarkes Tarzian, Incorporated indicated in a letter to all their key accounts that the supply of selenium removed from the ground in 1953 will be no greater than in 1952.

Since requirements are increasing, Sarkes Tarzian, Incorporated, has been trying a new method of reclaiming selenium from defective rectifiers. They are therefore interested in obtaining defective, out of warranty, selenium rectifiers and suggest contacting your local Sarkes Tarzian Distributor for further details.

SURVEY

Elmo Roper, noted market research expert, recently conducted a survey sponsored by the RCA Victor Division of the Radio Corporation of America, And the RCA Service Company.

The survey, concerning television service technicians, indicated that the great majority of the 5000 TV families interviewed found Service technicians competent, courteous, prompt in answering calls and fair and reasonable in their charges.

Results of the study shows an even higher public regard for television technicians than was revealed in a similar survey taken by Roper last year.

"The results of this survey should be a source of assurance to the public, and a source of pride to technicians in the entire television service industry," E. C. Cahill, president of the RCA Service Company, said in a letter about the study to managers of Better Business Bureaus. "It represents a rousing vote of confidence from the poeple best able to evaluate TV service -- television set owners themselves.

* * *

We have had considerable requests from the field which have indicated a need for information on antenna rotators and control units.

In answer to these requests the following three pages of this Servicer are devoted to the Alliance Model ATR rotator and control unit. Information on other models will be presented in future issues of the Servicer.

Photos and information are from samples courtesy of Alliance Manufacturing Company, Alliance, Ohio.

SERVICE INFORMATION

Model ATR

The Alliance Tenna-Rotor Model ATR consists of a rotator unit and a remote control box, interconnected by a 4 conductor cable. This model provides for antenna rotation using a reversible, capacitor-type, 24 volt, AC motor. The rotation is limited by mechanical stops in the rotator unit. The switch knob on the control box, when turned to the right rotates the antenna clockwise, and to the left rotates the antenna counter-clockwise. The light on the control box flashes on when the rotator reaches the full clockwise or counter-clockwise limits.

"POWER OFF" ADJUSTMENTS TO CHECK

ROTATOR (Motor Section)

1. Outside set screw must be backed off from finger tight position 1/4 to 1/2 turn and nut tightened.
2. Hollow shaft must have "play".

CONTROL BOX

1. Primary input contacts should be .020 in. apart should make solid contact for left and right position of switch.

CAUTION

Control box line cord should be plugged into 110 volt, 60 cycle, AC only.

Rotator terminals should be supplied with current from the control box only, since transformer contained therein is designed to supply the correct motor voltage.

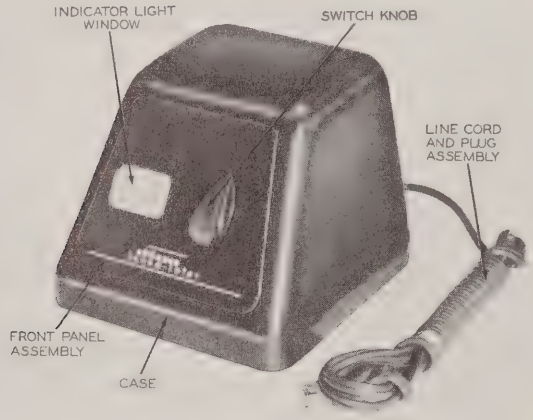


Figure 1. Remote Control Unit.

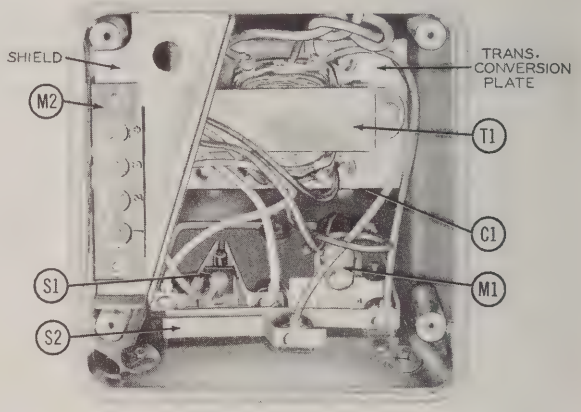
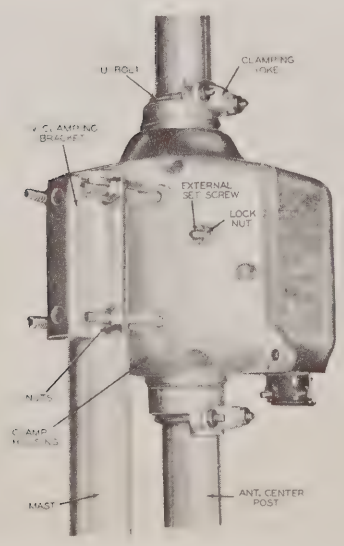


Figure 3. Internal Components of Control Unit, Cover Removed.



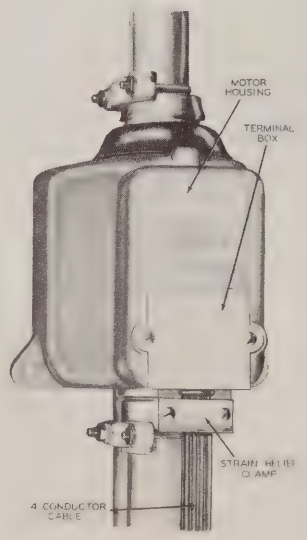


Figure 2. Rotator Unit, Front and Rear View.

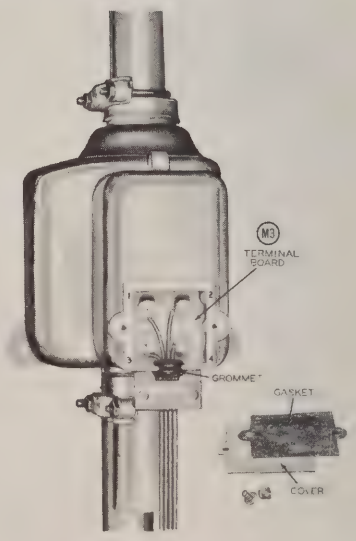


Figure 4. Terminal Connections.

Do not lubricate any moving parts within the rotator housing. Proper all weather lubrication is provided at the factory.

The unit is designed to carry approximately 20 lbs. of antenna. Any arrays weighing more require an accessory thrust bracket. For heavier arrays, a ball bearing, thrust bracket which will mount on the mast below the rotator can be supplied. Alliance Model No. TBB.

This unit comes from the factory rotated to the stop or end of rotation. For proper orientation point the antenna north upon installation. The rotator speed is approx. 1 RPM. Allowing the user to determine the antenna's position by timing the rotation. Each 15 seconds is equal to approx. 90 degrees.

Neither the control box or rotator are interchangeable with any other model Tenna-rotors.

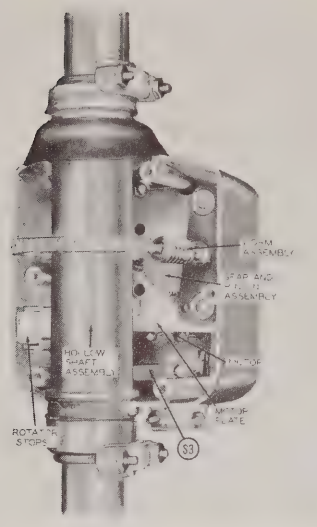


Figure 5. Internal Components of Rotator.

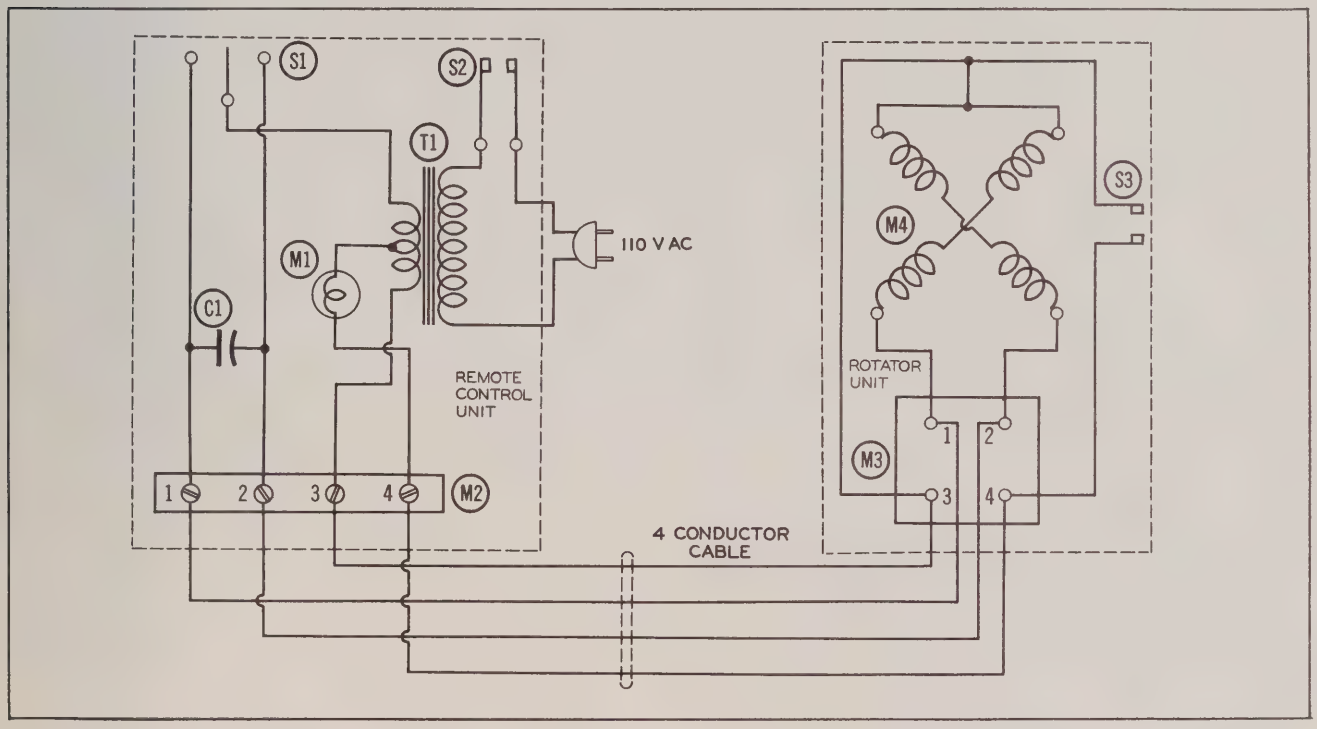


Figure 6. Schematic Wiring Diagram of Units and Interconnecting Cable.

TROUBLE SHOOTING

ROTATOR UNIT

TROUBLE.	CAUSE
1. Low torque.	1. Check power-off adjustments.
2. Light fails to operate at stops.	2. Inside contacts to terminals 3 and 4 must be adjusted.

CONTROL BOX

TROUBLE	CAUSE
1. Light does not work.	1. Faulty bulb or socket, or tap of transformer.

TROUBLE	CAUSE
2. Unit will run motor one way only.	2. Secondary (SPDT) switching mechanism is not making contact when knob is turned.
3. Rotator turns one way only.	3. May be bad secondary switching mechanism.
4. Failure of light to operate on one end.	4. Usually means bad bulb or stop contacts in rotor are bent.
5. Common fault of burnt out transformers in this model.	5. Generally due to a worn out switch plate (T-shaped) which allows the contact points to remain closed, or loose screws in contact point springs which will also allow points to remain closed causing the transformer to function.
6. In original models quite some trouble was experienced from motor stalling.	6. It was found that the fiber washers used on motor shaft to give proper end play were swelling due to condensation. This was quickly noticed and the fiber washer was replaced by use of an aluminum spacer.

SERVICE TIPS

A method for connecting the four conductor to the control box when the connections at the rotator on top of the pole are unknown:

1. Put one ohmmeter connection to wire "A". Touch the other ohmmeter connection to each of the other three wires. Repeat by putting one ohmmeter connection to wire "B" and touching the remaining three wires with the other ohmmeter connection. Repeat for wires "C" and "D". A reading of 16 Ω (plus one Ω for each 50 feet of four wire conductor used) across two wires indicates that these two wires are to be connected to terminals #1 and #2 of the control box either way. Connect the remaining two wires to terminals #3 and #4 either way.

2. Connect plug to 110 volts.

3. Push the switch to the left. If the light does not go out, interchange the wires to terminals #1 and #2. Again push the switch to the left. After the light goes out, push the switch to the right. If the light fails to go on again, interchange the wires to terminals #3 and #4.

For rotator in unknown position:

4. Follow step 1 and 2.

5. Have someone watch the antenna. Push the switch to the left and to the right. If the antenna fails to move, interchange the wires to terminals #3 and #4.

6. Pushing the switch right should move the antenna N-E-S-W. If the antenna moves N-W-S-E when the switch is pushed to the right, interchange the wires to terminals #1 and #2.

PARTS LIST

Item No.	Name	Part No.
	Control Box Complete	Z-3466-R
	Case	Z-3390-R

PARTS LIST (Continued)

Item No.	Name	Part No.
	Front panel complete	Y-3527-R
	Front panel only	Z-3388-A
M-1	Bulb (6 volt Type 47)	X-3395-A
T-1	Transformer	Y-4387-B
	Transformer conversion plate	X-4231-A
C-1	Capacitor (70 MFD 50 VAC)	X-4098-A
M-2	Terminal strip assembly	X-3803-R
	Shield	Y-3956-A
	Cover plate assembly	X-3984-V
	Feet	X-3393-A
	Assorted hardware	RCR-CP
	Rotor complete	Z-3399-R
	Rotor clamp housing	Y-3383-R
	Rotor motor housing	Y-3382-R
	Hollow shaft assembly	Y-3378-R
	Motor and Gear assembly	Y-3374-R
M-4	Motor (includes pinion gear)	Y-4254-R
	Motor plate	X-4253-A
	Worm assembly	Y-3355-R
	Pinion gear (includes pin)	X-3370-A
	Gear & pinion assy (Intermediate gear-includes pin)	X-3373-R
	Separate parts bag	X-4162-A

The PHOTOFACT Servicer

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January 1, 1953

(* Indicates non-members)

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*American Radio Hardware Co., Inc., Mt. Vernon, N. Y.	502
*American Radionic Co., Inc., Brooklyn 17, N. Y.	648
*American Television, Inc., Chicago 5, Ill.	633
American Television & Radio Co., St. Paul 1, Minn.	551
*The American Woodworking Co., West Haven 16, Conn.	729
Amperex Electronic Corporation, Brooklyn 1, N. Y.	111
Amy, Aceves & King, Inc., New York 18, N. Y.	112
*Anaconda Wire & Cable Company, Hastings-On-Hudson 6, N. Y.	547
*Anchor Electronics Inc., Union City, N. J.	707
*Anchor Plastics Company, Inc., New York 13, N. Y.	629
Anchor Radio Corporation, Chicago 23, Ill.	623
*Andrea Radio Corporation, Long Island City 1, N. Y.	113
Andrew Corporation, Chicago 19, Ill.	402
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Antenna & Mounting Hardware Co., Franklin Park, Ill.	814
A. R. F. Products, Inc., River Forest, Ill.	115
The Arnold Engineering Company, Sub. of Allegheny Ludlum Steel Corp., Marengo, Ill.	116
Arvin Industries, Inc., Columbus, Ind.	248
Atlantic Wire & Cable Company, College Point 56, N. Y.	792
*The Astatic Corporation, Conneaut, Ohio	345
Audak Company, Inc., New York 18, N. Y.	517
*Audio Electric Company, Chicago 26, Ill.	514
*Audio-Tone Oscillator Company, Bridgeport 3, Conn.	118
Automatic Manufacturing Corp., Newark 4, N. J.	119
Automatic Radio Mfg. Co., Inc., Boston 15, Mass.	120
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Barnes Metal Products Company, Chicago 23, Ill.	588
Basler Electric Company, Highland, Ill.	695
The Bead Chain Manufacturing Co., Bridgeport 5, Conn.	122
Belden Manufacturing Company, Chicago 44, Ill.	579
Bell Sound Systems, Inc., Columbus 7, Ohio	708
*Better Coils, Inc., Goodland, Ind.	831
Bendix Radio, Division of Bendix Aviation Corp., Baltimore 4, Md.	125
Bentley, Harris Mfg. Company, Conshohocken, Pa.	126
*Best Manufacturing Co., Inc., Irvington 11, N. J.	371
Bliley Electric Company, Erie, Pa.	128
David Bogen Co., Inc., New York 12, N. Y.	589
*Bradley Laboratories, Inc., New Haven 11, Conn.	812
The William Brand and Co., Inc., Willimantic, Conn.	130
British Industries Corporation, New York 13, N. Y.	409
Brubaker Manufacturing Company, Inc., Los Angeles 34, Calif.	817
*Brunswick Division, Radio & Television Inc., New York 19, N. Y.	278
Caledonia Electronics & Transformer Corp., Caledonia, N. Y.	503
*California Magnetic Control Corp., North Hollywood, Calif.	799
Camburn, Inc., Woodside, Long Island, N. Y.	450
C. F. Cannon Co., Springwater, N. Y.	133
Cannon Electric Company, Los Angeles 31, Calif.	440
Capehart-Farnsworth Corporation, Fort Wayne 1, Ind.	177
Carbonneau Industries, Inc., Grand Rapids 2, Mich.	719
The Allen D. Cardwell Manufacturing Corp., Plainville, Conn.	827
Carter Parts Company, Chicago 10, Ill.	610
CBS-Columbia Inc., Subsidiary of Columbia Broadcasting System, Inc., Brooklyn 32, N. Y.	105
CBS-Hytron, Division of Columbia Broadcasting System Inc., Danvers, Mass.	210
Celco (Constantine Engineering Labs. Co.), Mahwah, N. J.	692
Centralab, Div. of Globe-Union Inc., Milwaukee 1, Wis.	134
Central Coil Company, Inc., Indianapolis 22, Ind.	637
Chicago Condenser Corporation, Chicago 47, Ill.	135
*Chicago Electronic Engineering Company, Inc., Chicago 47, Ill.	166
*Chicago Radionics Corporation, Chicago 14, Ill.	798
Chicago Telephone Supply Corp., Elkhart, Ind.	137
Chicago Transformer Division, Essex Wire Corporation, Chicago 18, Ill.	138
Cinch Manufacturing Corporation, Chicago 24, Ill.	139
Circuitron, Inc., Hoboken, N. J.	790
Clarostat Mfg. Co., Inc., Dover, N. H.	140
*Cleveland Electronics, Inc., Cleveland 3, Ohio	433
Clippard Instrument Laboratory, Inc., Cincinnati 14, Ohio	530
*Coil Engineering & Mfg. Co., Inc., Roanoke, Ind.	141
Columbus Process Co., Inc., Columbus, Ind.	450
Communication Measurements Laboratory, Inc., Plainfield, N. J.	427
*Communications Company, Inc., Coral Gables 34, Fla.	462
Conrac Incorporated, Glendora, Calif.	680
Consolidated Wire & Associated Companies, Chicago 16, Ill.	607
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*Continental Electric Company, Geneva, Ill.	147
Continental Electronics Corp., Philadelphia 31, Penna.	811
*Control Corporation, Minneapolis 14, Minn.	712
Co-Operative Industries, Inc., Chester, N. J.	760
Copperweld Steel Company, Glassport, Pa.	725
Corning Glass Works, Corning, N. Y.	148

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Cornish Wire Company, Inc., New York 7, N. Y.	149
Cosmic Radio Corporation, New York 59, N. Y.	704
Crescent Industries, Inc., Chicago 31, Ill.	150
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Croname, Incorporated, Chicago 13, Ill.	151
Crosley Division, Avco Manufacturing Corp., Cincinnati 25, Ohio	152
Crucible Steel Company of America, New York 17, N. Y.	525
*Custom Parts Corporation, Mattituck, N. Y.	779
Dale Products, Inc., Columbus, Nebr.	816
J. W. Davis & Company, Dallas 9, Texas	563
*Davis Electric Company, Cape Girardeau, Mo.	628
Daystrom Electric Corporation, Poughkeepsie, N. Y.	788
*Dearborn Glass Company, Chicago 8, Ill.	385
DeJur-Amsco Corporation, Long Island City 1, N. Y.	780
Delco Radio Division, General Motors Corporation, Kokomo, Ind.	466
*Tobe Deutschmann Corporation, Norwood, Mass.	154
DeWald Radio Mfg. Corp., Long Island City 1, N. Y.	155
*Dormitzer Electric & Mfg. Co., Inc., Cambridge, Mass.	493
Drake Manufacturing Company, Chicago 22, Ill.	586
Wilbur B. Driver Company, Newark 4, N. J.	156
DuKane Corporation, St. Charles, Ill.	252
*Dumont Electric Corporation, New York 34, N. Y.	157
Allen B. DuMont Laboratories, Inc., Clifton, N. J.	158
*DX Radio Products Company, Inc.. Chicago 47, Ill.	159
Hugh H. Eby, Inc., Philadelphia 44, Pa.	160
Eckstein Radio & Television Co., Minneapolis 6, Minn.	161
Eitel-McCullough, Inc., San Bruno, Calif.	162
*Elco Corporation, Philadelphia 40, Pa.	599
Eldico of New York, Inc., Douglaston, N. Y.	783
*Electrical Utilities Company, La Salle, Ill.	569
*Electrical Windings, Inc., Chicago 39, Ill.	682
*Electro-Mechanical Products Corporation, Riverhead, N. Y.	775
*The Electrometric Co., Woodstock, Ill.	758
The Electro Motive Mfg. Co., Inc., Willimantic, Conn.	164
*Electronic Components Corporation, Chicago 10, Ill.	515
Electronic Devices, Inc., Brooklyn 15, N. Y.	752
*Electronic Expediters, Chicago 1, Ill.	755
Electronic Products Company, Mount Vernon, N. Y.	557
Electronics & Nucleonics, Inc., New York 1, N. Y.	763
Electronic Tube Corporation, Philadelphia 18, Penna.	170
Electro-Voice, Inc., Buchanan, Mich.	649
Ellar Woodcraft Corporation, New York 1, N. Y.	576
*El-Rad Manufacturing Co., Chicago 13, Ill.	632
Eltran Corporation, St. Anne, Ill.	603
*Emerald Manufacturing Company, Chicago 30, Ill.	800
Emerson Radio & Phonograph Corp., New York 11, N. Y.	171
Empire Coil Company, Inc., New Rochelle, N. Y.	452
Ensign Coil Company, Chicago 23, Ill	172
Erca Tool Die & Stamping Co., Brooklyn 22, N. Y.	762
Erie Resistor Corporation, Erie, Pa.	173
Espey Manufacturing Co., Inc., New York 21, N. Y.	174
*Esquire Radio Corporation, Brooklyn 19, N. Y.	742
*Essex Electronics, Berkeley Heights, N. J.	425
*Essex Wire Corporation, Fort Wayne 6, Ind.	175
*Eureka Television and Tube Corp., Hawthorne, N. J.	823
Fada Radio and Electric Co., Inc., Belleville, N. J.	176
John E. Fast & Company, Chicago 41, Ill.	178
Federal Telephone & Radio Corp., Clifton, N. J.	179
Fidelity Products Co., Inc., So. Orange, N. J.	494
Forbes & Wagner, Inc., Silver Creek, N. Y.	701
*The Forest Electric Company, Forest Park, Ill.	773
*The Formatic Company, Naugatuck, Conn.	735
*Foster Transformer Company, Cincinnati 23, Ohio	394
Fretco Incorporated, Pittsburgh 13, Penna.	734
L. H. Frost & Company, Grand Rapids 2, Mich.	746
*F. & V. Coil Winding Corporation, Newark 5, N. J.	572
*Garod Radio Corporation, Brooklyn 1, N. Y.	186
*Gates Radio Company, Quincy, Ill.	187
*Gavitt Mfg. Co., Inc., Brookfield, Mass.	360
General Cement Mfg. Co., Rockford, Ill.	396
General Ceramics and Stealite Corp., Keasbey, N. J.	685
*General Dry Batteries, Inc., Cleveland 7, O.	807
General Electric Company, Syracuse 1, N. Y.	188
*General Electronics, Inc., Paterson 3, N. J.	189
The General Industries Company, Elyria, Ohio	190
General Instrument Corporation, Elizabeth 3, N. J.	191
General Laminated Products, Inc., Chicago 8. Ill.	192
General Magnetic Corporation, Detroit 34, Mich.	193
General Radio Company, Cambridge 39, Mass.	194
General Railway Signal Company, Rochester 2, N. Y.	644
*General Transformer Company, Homewood, Ill.	412
General Vacuum Tube Corp., Ardsley, N. Y.	714
G & H Wood Products Company, Brooklyn 11, N. Y.	795
Gits Molding Corporation, Chicago 44, Ill.	196
Glaser-Steers Corporation, Belleville 9, N. J.	670
*Glass Products Company, Chicago 37, Ill.	475
The Fred Goat Co., Inc., Brooklyn 17, N. Y.	197
Good-All Electric Mfg. Co., Ogalalla, Nebr.	446
Gramer Transformer Corporation, Chicago 39, Ill.	596
*Grand Transformers, Inc. Grand Haven, Mich.	757
Grayburne Corporation, Yonkers, N. Y.	759
Grigsby-Allison Company, Inc., Arlington Heights, Ill.	467
The Gudeman Company, Chicago 10, Ill.	438
Edwin I. Guthman & Co., Inc., Chicago 7, Ill.	198
*The Halldorson Company, Chicago 40, Ill.	556
The Hallicrafters Co., Chicago 24, Ill.	199
Hammarlund Mfg. Co., Inc., New York 1, N. Y.	201
Hardwick, Hindle, Inc., Newark 5, N. J.	411
Harman-Kardon, Inc., New York 12, N. Y.	794
Harnett Electric Corporation, Port Washington, N. Y.	481
Hawley Products Company, St. Charles, Ill.	204
Haydon Products Corporation, Brooklyn 15, N. Y.	766
Haydu Brothers, Plainfield, N. J.	205
Hazeltine Electronics Corporation, Little Neck, Long Island, N. Y.	376
Hedco Manufacturing Corporation, Chicago 10, Ill.	535
*Henald Manufacturing Co., St. Anne, Ill.	808
*Heppner Manufacturing Company, Round Lake, Ill.	575
Herlec Corporation, Sub. of Sprague Electric Co., Grafton, Wis.	457
The Hickok Electrical Instrument Co., Cleveland 8, O.	508
*Hillburn Electronic Products Co., Brooklyn 22, N. Y.	687
*Hinners-Galanek Radio Corporation, Long Island City 6, N. Y.	786
Hi-Q Division Aerovox Corporation, Olean, N. Y.	163
Hoffman Radio Corporation, Los Angeles 7, Calif.	207
John R. Hollingsworth Corporation, Clifton Heights, Pa.	559
*Holyoke Wire and Cable Corporation, Holyoke, Mass.	372
*Homecraft Manufacturing Co., Newark 5, N. J.	729
Hopkins Engineering Company Inc., Altadena, Calif.	791
Hughes Aircraft Company, Culver City, Calif.	744
Illinois Condenser Co., Chicago 22, Ill.	616
The Indiana Steel Products Company, Chicago 2, Ill.	211
Industrial Development Engineering Associates, Inc., Indianapolis 4, Indiana	638
Industrial Television, Inc., Clifton, N. J.	541
International Resistance Company, Philadelphia 8, Pa.	214
Irvington Varnish & Insulator Co., Irvington 11, N. J.	215
Jackson Electrical Instrument Co., Dayton 1, Ohio	216
Jackson Industries, Inc., Chicago 15, Ill.	217
J-B-T Instruments, Inc., New Haven 8, Conn.	442
Jeffers Electronics Division, Speer Carbon Company, Dubois, Penna.	724
Jefferson Electric Company, Bellwood, Ill.	218
Jefferson-Travis Incorporated (Emerson Radio & Phonograph), New York 11, N. Y.	219
Jensen Manufacturing Company, Div. of The Muter Company, Chicago 38, Ill.	220
Jersey Specialty Co., Inc., Little Falls, N. Y.	730
J. F. D. Manufacturing Co., Inc., Brooklyn 4, N. Y.	221
E. F. Johnson Company, Waseca, Minn.	222
Johnson Electronics, Orlando, Fla.	784
Johnson & Hoffman Manufacturing Co., Mineola, N. Y.	639
Kav Electric Company, Pine Brook, N. J.	620
Kerrigan Lewis Manufacturing Co., Chicago 51, Ill.	223
Kester Solder Company, Chicago 39, Ill.	224
Keystone Electronics Company, Stamford, Conn.	699
Kimble Glass Company, Sub. of Owens-Illinois Glass Co., Toledo 1, Ohio	647
King Laboratories, Inc., Syracuse 4, N. Y.	225
Kip Electronics Corporation, New York 14, N. Y.	593
The James Knights Company, Sandwich, Ill.	504
*Laidman & Company, Chicago 22, Ill.	777
LaPointe Electronics Inc., Rockville, Conn.	577
Lenz Electric Manufacturing Co., Chicago 47, Ill.	228
*Leonard Electric Products Co., Inc., Brooklyn 32, N. Y.	570
Lewis and Kaufman, Ltd., Los Gatos, Calif.	738
Littelfuse, Incorporated, Des Plaines, Ill.	230
Lowell Manufacturing Company, St. Louis 17, Mo.	657
Lyman Electronic Corporation, Springfield, Mass.	559
*Lytle Engineering & Mfg. Co., Chicago 25, Ill.	671
Machlett Laboratories, Incorporated, Springdale, Conn.	231
Macon Electronics, Div. York Radio & Television Corp., Decatur, Ill.	774
The Magnavox Company, Fort Wayne 4, Ind.	232
*Magnetic Windings Division (Essex Wire Corporation), Easton, Pa.	352

Code No.	Company
235	P. R. Mallory & Co., Inc., Indianapolis 6, Ind.
806	*Mark Electronics Inc., Newark 2, N. J.
609	Markel Electric Products, Inc., Buffalo 3, N. Y.
686	H. S. Martin & Company, Evanston, Ill.
655	J. A. Maurer, Inc., Long Island City 1, N. Y.
832	McCoy Electronics Co., Mt. Holly Springs, Penna.
789	McGregor Electronic Industries, Inc., McGregor, Ia.
793	McIntosh Laboratory, Inc., Binghamton, N. Y.
236	Measurements Corporation, Boonton, N. J.
239	*Merit Transformer Corporation, Chicago 40, Ill.
720	Methode Manufacturing Corp., Chicago 47, Ill.
240	Micamold Radio Corporation, Brooklyn 37, N. Y.
803	Microwave Associates, Inc., Boston 15, Mass.
828	Midland Manufacturing Co., Inc., Kansas City 15, Kan.
549	*Mid-West Coil & Transformer Co., Chicago 14, Ill.
242	James Millen Manufacturing Co., Inc., Malden 48, Mass.
722	Milwaukee Resistor Company, Milwaukee 4, Wis.
424	*Milwaukee Stamping Company, Milwaukee 14, Wis.
445	*Mississippi Products, Inc., Jackson, Miss.
805	Morgan-Rhein, Inc., Orlando, Fla.
750	Mosley Electronics, Overland 14, Mo.
185	Motorola Inc., Chicago 51, Ill.
693	Multi-Tron Laboratory, Chicago 44, Ill.
772	Muntz TV, Inc., Chicago 13, Ill.
244	The Muter Company, Chicago 5, Ill.
642	Mycalex Corporation of America, Clifton, N. J.
643	National Aeronautical Corporation, Ambler, Pa.
245	National Company, Inc., Malden 48, Mass.
769	National Electric Products Corp., Pittsburgh 30, Penna.
749	*National Electronics, Inc., Geneva, Ill.
246	National Fabricated Products, Inc., Chicago 47, Ill.
367	National Moldite Company, Hillside 5, N. J.
247	National Union Radio Corporation, Orange, N. J.
479	Natvar Corporation, Woodbridge, N. J.
437	*Newcomb Audio Products Company, Hollywood 38, Calif.
366	New York Transformer Co., Inc., Alpha, N. J.
423	North American Philips Company, Inc., New York 17, N. Y.
723	Northwest Plastics, Inc., St. Paul, Minn.
739	Oak Electronics Company, Buffalo 3, N. Y.
249	Oak Mfg. Co., Chicago 10, Ill.
776	*Ogden Coil & Transformer Co., Chicago 12, Ill.
250	The Ohio Carbon Company, Cleveland 11, Ohio
251	Ohmite Manufacturing Company, Chicago 44, Ill.
740	Olympic Metal Products Co., Inc., Alpha, N. J.
656	Orsyd Company, Detroit 10, Mich.
552	Otis Radio & Electric Corp., Hawarden, Iowa
465	Oxford Electric Corporation, Chicago 15, Ill.
254	Packard-Bell Company, Los Angeles 64, Calif.
257	Parisian Novelty Company, Chicago 9, Ill.
736	*Paul & Beekman, Inc., Philadelphia 40, Pa.
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665	Penn Tran Corporation, Bellefonte, Pa.
771	Penta Laboratories, Inc., Santa Barbara, Calif.
592	Perfection Electric Company, Chicago 16, Ill.
754	*Permaglass, Incorporated, Genoa, O.
258	Permoflux Corporation, Chicago 39, Ill.
395	*Permoflux Corporation, Glendale 5, Calif.
259	Permo, Incorporated, Chicago 26, Ill.
697	*Phalo Plastics Corporation, Worcester 8, Mass.
260	Philco Corporation, Philadelphia 34, Pa.
	*Philharmonic Radio & Television Corp., New Brunswick, N. J.
261	Philmore Manufacturing Co., Inc., New York 3, N. Y.
262	Pickering and Company, Inc., Oceanside, N. Y.
631	Pilot Radio Corporation, Long Island City 1, N. Y.
264	Pioneer Electronics Corporation, Santa Monica, Calif.
706	*Planet Manufacturing Corporation, Bloomfield, N. J.
761	*Plastoid Corporation, Hamburg, N. J.
435	Polarad Electronics Corporation, Brooklyn 11, N. Y.
562	*Polytron Corporation, White Plains, N. Y.
801	Powdered Metal Products Corporation of America, Franklin Park, Ill.
539	Precision Apparatus Company, Inc., Elmhurst, L. I., N. Y.
505	Premax Products Division, Chisholm-Ryder Co., Inc., Niagara Falls, N. Y.
267	*R. Prescott & Son, Inc., Keeseville, N. Y.
356	Product Development Co., Inc., Arlington, N. J.
703	*Pyramid Electric Company, North Bergen, N. J.
472	*Q. L. C. Corporation, Summit, N. J.
464	Quam-Nichols Company, Chicago 16, Ill.
270	Quincy Speaker Manufacturing Corp., Quincy, Ill.
767	Rada Products Co., Chicago 12, Illinois
482	Radell Corporation, Santurce 34, P. R.
829	Radio Apparatus Corporation, Indianapolis 4, Ind.
702	Radio Condenser Company, Camden 3, N. J.
273	Radio Corporation of America, RCA Victor Division, Camden, N. J.
274	The Radio Craftsmen, Inc., Chicago 16, Ill.
275	Radio Development & Research Corp., Jersey City 4, N. J.
419	Radio Engineering Laboratories, Inc., Long Island City 1, N. Y.
276	Radio Industries, Inc., Chicago 40, Ill.
540	Radiomarine Corporation of America, New York 13, N. Y.
448	Radio Materials Corporation, Chicago 18, Ill.
732	The Radion Corporation, Chicago 22, Ill.
700	Radionic Controls, Inc., Herrin, Ill.
447	Radio Receptor Company, Inc., New York 11, N. Y.
380	Radio Specialty Manufacturing Co., Portland 14, Oregon
587	Radio Television Products Corp., Grass Lake, Mich.
489	RAM Electronics, Inc., Irvington-on-Hudson, N. Y.
617	Raytheon Manufacturing Company, Newton 58, Mass.
280	Raytheon Manufacturing Company, Television & Radio Division, Chicago 39, Ill.
124	Rea Magnet Wire Company, Inc., Fort Wayne 4, Ind.
281	*Red Lion Cabinet Company, Red Lion, Pa.
384	*Redmond Company, Inc., Owosso, Mich.
753	*Regal Electronics Corporation, New York 27, N. Y.
373	Rego Insulated Wire Co., Hoboken, N. J.
778	Remington Rand Inc., South Norwalk, Conn.
283	Remler Company, Ltd., San Francisco 10, Calif.
284	Rhode Island Insulated Wire Co., Inc., Cranston, R. I.
678	*Rieder Bros., Philadelphia 34, Penna.
727	*Rogers Electronic Corp., New York 12, N. Y.
677	The Rola Company, Inc., Div. of The Muter Company, Cleveland 14, Ohio
285	*Rollan Electric Co., Chicago 19, Ill.
721	The Ross Manufacturing Company, Burlington, Iowa
286	Rowe Industries, Toledo 9, Ohio
580	*Sampsel Time Control, Inc., Spring Valley, Ill.
711	*Sampson Electric Products Co., Clinton, N. C.
518	San Fernando Electric Mfg. Co., San Fernando, Calif.
815	Sangamo Electric Company, Springfield, Ill.
658	*Sarkes Tarzian, Inc., Bloomington, Ind.
684	Schneider & Marquard, Inc., Brooklyn 17, N. Y.
520	Walter L. Schott Company, Los Angeles 18, Calif.
287	J. P. Seeburg Corporation, Chicago 22, Ill.
289	Sentinel Radio Corporation, Evanston, Ill.
291	Sheffco Manufacturing Co., Palisades Park, N. J.
698	Sheldon Electric Company, Div. of Allied Electric Products, Inc., Irvington 11, N. J.
636	Sherron Electronics Company, Div. of Sherron Metallic Corp., Brooklyn 6, N. Y.
293	Shoup Engineering Company, Chicago 16, Ill.
674	Shure Brothers, Incorporated, Chicago 10, Ill.
590	Shurite Meters (J-B-T Instruments, Inc.), New Haven 8, Conn.
484	F. W. Sickles Division, Sub. of General Instrument Corp., Chicopee, Mass.
294	Simpson Electric Company, Chicago 44, Ill.
614	*Mark Simpson Manufacturing Co., Inc., Long Island City 3, N. Y.
295	*Solar Manufacturing Corporation, Los Angeles 58, Calif.
296	*Sonora Radio & Television Corp., Chicago 12, Ill.
297	*Sonotone Corporation, Elmsford, N. Y.
787	*Sparton Radio-Television Division, The Sparks Withington Company, Jackson, Mich.
299	Special Products Company, Silver Spring, Md.
474	Speer Resistor Division, Speer Carbon Company, St. Marys, Penna.
300	Spencer Kennedy Laboratories, Inc., Cambridge 39, Mass.
782	Sprague Electric Company, North Adams, Mass.
303	Square Root Manufacturing Company, Yonkers 2, N. Y.
654	Stackpole Carbon Company, St. Marys 3, Pa.
304	*Standard Coil Products Co., Inc., Chicago 39, Ill.
305	*Standard Condenser Company, Chicago 47, Ill.
710	*Standard Electrical Products Co., Dayton 3, Ohio
668	Standard Electronics Corporation, New York 18, N. Y.
694	Standard Piezo Company, Carlisle, Pa.
501	Standard Transformer Corporation, Chicago 18, Ill.
306	*Standard Winding Company, Newburgh, N. Y.
550	*Stanwyck Winding Company, Newburgh, N. Y.
574	*Star Products Company, Chicago 16, Ill.
613	The Staver Company Incorporated, Bay Shore, L. I.
604	Stevens Wire Insulating Company, Chicago 30, Ill.
597	Stewart-Warner Electric, Div. of Stewart-Warner Corporation, Chicago 14, Ill.
307	*Stoddart Aircraft Radio Co., Hollywood 38, Calif.
369	Stone City Machine & Tool Co., Inc., Bedford, Ind.
770	Stromberg-Carlson Company, Rochester 3, N. Y.
308	Stupakoff Ceramic & Mfg. Co., Latrobe, Pa.
309	

Company	Code No.
*Superior Transformer Corp., Chicago 47, Ill.	826
Superior Tube Company, Norristown, Pa.	310
Supreme, Incorporated, Greenwood, Miss.	311
*Supreme Transformer Corporation, Chicago 12, Ill.	798
Surprenant Mfg. Co., Boston 8, Mass.	624
Sylvania Electric Products Inc., Emporium, Penna. (*Colonial*)	142
(*Sylvania*)	312
Symphonic Radio and Electronic Corp., Cambridge 42, Mass.	351
Synthane Corporation, Oaks, Pa.	313
*Syntronic Instruments, Inc., Addison, Ill.	822
Talk-A-Phone Co., Chicago 23, Ill.	132
Taylor Tubes, Inc., Chicago 47, Ill.	713
*Tech-Master Products Company, New York 13, N. Y.	679
Technical Appliance Corporation, Sherburne, N. Y.	737
Technology Instrument Corporation, Acton, Mass.	715
Tele King Corporation, New York 1, N. Y.	583
Telequip Radio Company, Chicago 8, Ill.	454
*Teleradio Engineering Corporation, Wilkes Barre, Pa.	357
Tel-Instrument Co., Inc., East Rutherford, N. J.	536
*Tel-O-Tube Corporation of America, East Paterson, N. J.	818
*TELvision Laboratories, Inc., Chicago 44, Ill.	608
*Tempel Manufacturing Company, Chicago 26, Ill.	745
Tempo TV Products Company, Los Angeles 33, Calif.	802
*Thermador Electrical Mfg. Co., Los Angeles 22, Calif.	825
*Thomas & Skinner Steel Products Co., Indianapolis 7, Ind.	318
Thomas Electronics, Inc., Passaic, N. J.	672
*Thordarson-Meissner Manufacturing Division, Maguire Industries, Inc., Chicago 10, Ill.	238
*Ticon Inc., Bridgeport, Conn.	690
*Todd Products Co., Inc., Mt. Vernon, N. Y.	634
*Todd-Tran Corp., Mt. Vernon, N. Y.	635
*B. J. Toegel, Inc., Plainfield, N. J.	548
*Trad Television Corporation, Asbury Park, N. J.	688
Translite Electronics Corp., Chicago 39, Ill.	810
Trav-Ler Radio Corporation, Chicago 6, Ill.	320
*Triad Transformer Corporation, Venice, Calif.	830
Triplett Electrical Instrument Co., Bluffton, Ohio	321
Triwec Transformer Company, Chicago 18, Ill.	524
Tung-Sol Electric Inc., Newark 4, N. J.	322
The Turner Company, Cedar Rapids, Iowa	696
*TV Products Corporation, Paterson 3, N. J.	618
*The Ucinite Company, Newtonville, Mass.	381
*Union Electric & Manufacturing Co., Jersey City, N. J.	804
*United-Carr Fastener Corporation, Cambridge 42, Mass.	370
United Condenser Corporation, New York 54, N. Y.	516
United Electronics Company, Newark 2, N. J.	323
*United Electronic Manufacturing Corp., Union City, N. J.	820
*United States Radium Corporation, New York 7, N. Y.	324
*United Transformer Corporation, New York 13, N. Y.	418
Universal Company, High Point, N. C.	756
Universal Vacuum Tube Corp., Yonkers 2, N. Y.	821
Utah Radio Products Co., Inc., Huntington, Ind.	328
Vacuum Tube Products, Oceanside, Calif.	781
Valpey Crystal Corporation, Holliston, Mass.	527
Varian Associates, Palo Alto, Calif.	809
*Victor Electronic Mfg. Co., Chicago 39, Ill.	824
Vidaire Electronics Mfg. Co., Lynbrook, L. I., N. Y.	797
Videon Electronic Corporation, Indianapolis 4, Ind.	765
Vokar Corporation, Dexter, Mich.	168
John Volkert Metal Stampings Inc., Queens Village, Long Island, N. Y.	507
*Waldom Electronics, Inc., Chicago 10, Ill.	555
Wm. T. Wallace Mfg. Co., Inc., Peru, Ind.	330
*Ward Leonard Electric Co., Mount Vernon, N. Y.	532
Ward Products Corporation, Division of the Gabriel Company, Cleveland 3, Ohio	331
*Warwick Manufacturing Corporation, Chicago 44, Ill.	332
Waterman Products Company, Inc., Philadelphia 25, Pa.	431
*Webster-Chicago Corporation, Chicago 39, Ill.	375
Weller Electric Corporation, Easton, Pa.	662
Wells-Gardner & Co., Chicago 39, Ill.	334
Wm. H. Welsh Co., Inc., Chicago 16, Ill.	335
*Wesco Electric Company Inc., Chicago 30, Ill.	553
Western Electric Company, Inc., New York 5, N. Y.	336
Westinghouse Electric Corporation, Baltimore 3, Md.	337
Weston Electrical Instrument Corp., Newark 5, N. J.	338
*The Wheeler Insulated Wire Company, Inc., Waterbury 20, Conn.	392
Wheeler Laboratories, Inc., Great Neck, N. Y.	529
The Whitney Blake Company, New Haven 14, Conn.	741
*Wilder Manufacturing Corp., Herrin, Ill.	449
Wind Turbine Company, West Chester, Pa.	653
Winsted Division, Hudson Wire Company, Winsted, Conn.	666
*Wirt Company, Philadelphia 44, Penna.	406
W. M. C. Inc., Chicago 47, Ill.	584
Woodward-Schumacher Electric Corporation, Chicago 22, Ill.	606
The Workshop Associates Incorporated, Needham Heights 94, Mass.	397
*Worthco Corporation, Beverly Hills, Calif.	785
Wright Zimmerman, Inc., New Brighton, Minn.	683
*Zenith Optical Company, Huntington 19, W. Va.	621
Zenith Radio Corporation, Chicago 39, Ill.	343
Z & W Machine Products Inc., Cleveland 3, O.	819

NUMERICAL LIST

RTMA Production Source Code Symbols

January 1, 1953

(* Indicates non-members)

Code No.	Company
101	*Admiral Corporation, Chicago 47, Ill.
102	Aerovox Corporation, New Bedford, Mass.
105	CBS-Columbia Inc., Subsidiary of Columbia Broadcasting System, Inc., Brooklyn 32, N. Y.
106	Allen-Bradley Company, Milwaukee 4, Wis.
107	The Alliance Manufacturing Co., Alliance, Ohio
109	American Condenser Company, Chicago 40, Ill.
110	All Star Products, Inc., Defiance, Ohio
111	Amperex Electronic Corporation, Brooklyn 1, N. Y.
112	Amy, Aceves & King, Inc., New York 18, N. Y.
113	*Andrea Radio Corporation, Long Island City 1, N. Y.
115	A. R. F. Products, Inc., River Forest, Ill.
116	The Arnold Engineering Company, Sub. of Allegheny Ludlum Steel Corp., Marengo, Ill.
118	*Audio-Tone Oscillator Company, Bridgeport 3, Conn.
119	Automatic Manufacturing Corp., Newark 4, N. J.
120	Automatic Radio Mfg. Co., Inc., Boston 15, Mass.
122	The Bead Chain Manufacturing Co., Bridgeport 5, Conn.
124	Raytheon Manufacturing Company, Television & Radio Division, Chicago 39, Ill.
125	Bendix Radio, Division of Bendix Aviation Corporation, Baltimore 4, Md.
126	Bentley, Harris Manufacturing Co., Conshohocken, Pa.
128	Bliley Electric Company, Erie, Pa.
130	The William Brand and Co., Inc., Willimantic, Conn.
132	Talk-A-Phone Co., Chicago 23, Ill.
133	C. F. Cannon Co., Springwater, N. Y.
134	Centralab, Div. of Globe-Union Inc., Milwaukee 1, Wis.
135	Chicago Condenser Corporation, Chicago 47, Ill.
137	Chicago Telephone Supply Corp., Elkhart, Ind.
138	Chicago Transformer Division, Essex Wire Corporation, Chicago 18, Ill.
139	Cinch Manufacturing Corporation, Chicago 24, Ill.
140	Clarostat Mfg. Co., Inc., Dover, New Hampshire
141	*Coil Engineering & Mfg. Co., Inc., Roanoke, Ind.
146	Continental Carbon Inc., Cleveland 11, Ohio
147	*Continental Electric Company, Geneva, Ill.
148	Corning Glass Works, Corning, N. Y.
149	Cornish Wire Company, Inc., New York 7, N. Y.
150	Crescent Industries, Inc., Chicago 31, Ill.
151	Croname, Incorporated, Chicago 13, Ill.
152	Crosley Division, Avco Manufacturing Corporation, Cincinnati 25, Ohio
154	*Tobe Deutschmann Corporation, Norwood, Mass.
155	DeWald Radio Mfg. Corp., Long Island City 1, N. Y.
156	Wilbur B. Driver Company, Newark 4, N. J.
157	*Dumont Electric Corporation, New York 34, N. Y.
158	Allen B. DuMont Laboratories, Inc., Clifton, N. J.
159	*DX Radio Products Company, Inc., Chicago 47, Ill.
160	Hugh H. Eby, Inc., Philadelphia 44, Pa.
161	Eckstein Radio & Television Co., Minneapolis 6, Minn.
162	Eitel-McCullough, Inc., San Bruno, Calif.
163	Hi-Q Division Aerovox Corporation, Olean, N. Y.
164	The Electro Motive Mfg. Co., Inc., Willimantic, Conn.
166	*Chicago Electronic Engineering Company, Inc., Chicago 47, Ill.

Code No.	Company
168	Vokar Corporation, Dexter, Michigan
170	Electronic Tube Corporation, Philadelphia 18, Pa.
171	Emerson Radio & Phonograph Corp., New York 11, N. Y.
172	Ensign Coil Company, Chicago 23, Ill.
173	Erie Resistor Corporation, Erie, Pa.
174	Espey Manufacturing Company, Inc., New York 21, N. Y.
175	*Essex Wire Corporation, Fort Wayne 6, Ind.
176	Fada Radio and Electric Co., Inc., Belleville, N. J.
177	Capehart-Farnsworth Corporation, Fort Wayne 1, Ind.
178	John E. Fast & Company, Chicago 41, Ill.
179	Federal Telephone & Radio Corp., Clifton, N. J.
185	Motorola Inc., Chicago 51, Ill.
187	*Gates Radio Company, Quincy, Ill.
188	General Electric Company, Syracuse 1, N. Y.
189	*General Electronics, Inc., Paterson 3, N. J.
190	The General Industries Company, Elyria, Ohio
191	General Instrument Corporation, Elizabeth 3, N. J.
192	General Laminated Products, Inc., Chicago 8, Ill.
193	General Magnetic Corporation, Detroit 34, Mich.
194	General Radio Company, Cambridge 39, Mass.
196	Gits Molding Corporation, Chicago 44, Ill.
197	The Fred Goat Co., Inc., Brooklyn 17, N. Y.
198	Edwin I. Guthman & Company, Inc., Chicago 7, Ill.
199	The Hallicrafters Company, Chicago 24, Ill.
204	Hawley Products Company, St. Charles, Ill.
205	Haydu Brothers, Plainfield, N. J.
207	Hoffman Radio Corporation, Los Angeles 7, Calif.
210	CBS-Hytron, Division of Columbia Broadcasting System, Inc., Danvers, Mass.
211	The Indiana Steel Products Company, Chicago 2, Ill.
214	International Resistance Company, Philadelphia 8, Pa.
215	Irvington Varnish & Insulator Co., Irvington 11, N. J.
216	Jackson Electrical Instrument Co., Dayton 1, Ohio
217	Jackson Industries, Inc., Chicago 15, Ill.
218	Jefferson Electric Company, Bellwood, Ill.
219	Jefferson-Travis Incorporated (Emerson Radio & Phonograph Corp.), New York 11, N. Y.
220	Jensen Manufacturing Company, Div. of The Muter Company, Chicago 38, Ill.
221	J. F. D. Manufacturing Co., Inc., Brooklyn 4, N. Y.
222	E. F. Johnson Company, Waseca, Minn.
223	Kerrigan Lewis Manufacturing Co., Chicago 51, Ill.
224	Kester Solder Company, Chicago 39, Ill.
225	King Laboratories, Inc., Syracuse 4, N. Y.
228	Lenz Electric Manufacturing Co., Chicago 47, Ill.
230	Littelfuse, Incorporated, Des Plaines, Ill.
231	Machlett Laboratories, Incorporated, Springdale, Conn.
232	The Magnavox Company, Fort Wayne 4, Ind.
235	P. R. Mallory & Co., Inc., Indianapolis 6, Ind.
236	Measurements Corporation, Boonton, N. J.
238	*Thordarson-Meissner Manufacturing Division, Maguire Industries, Inc., Chicago 10, Ill.
239	*Merit Transformer Corp., Chicago 40, Ill.
240	Micamold Radio Corporation, Brooklyn 37, N. Y.
242	James Millen Manufacturing Co., Inc., Malden 48, Mass.
244	The Muter Company, Chicago 5, Ill.
245	National Company, Inc., Malden 48, Mass.
246	National Fabricated Products, Inc., Chicago 47, Ill.
247	National Union Radio Corporation, Orange, N. J.
248	Arvin Industries, Inc., Columbus, Ind.
249	Oak Mfg. Co., Chicago 10, Ill.
250	The Ohio Carbon Company, Cleveland 11, Ohio
251	Ohmite Manufacturing Company, Chicago 44, Ill.
252	DuKane Corporation, St. Charles, Ill.
254	Packard-Bell Company, Los Angeles 64, Calif.
257	Parisian Novelty Company, Chicago 9, Ill.
258	Permoflux Corporation, Chicago 39, Ill.
259	Permo, Incorporated, Chicago 26, Ill.
260	Philco Corporation, Philadelphia 34, Pa.
262	Philmore Manufacturing Co., Inc., New York 3, N. Y.
264	Pilot Radio Corporation, Long Island City 1, N. Y.
267	Premax Products Division, Chisholm-Ryder Co., Inc., Niagara Falls, N. Y.
270	Quam-Nichols Company, Chicago 16, Ill.
273	Radio Condenser Company, Camden 3, N. J.
274	Radio Corporation of America, RCA Victor Division, Camden, N. J.
275	The Radio Craftsmen, Inc., Chicago 16, Ill.
276	Radio Engineering Laboratories, Inc., Long Island City 1, N. Y.
278	*Brunswick Division, Radio & Television Inc., New York 19, N. Y.
280	Raytheon Manufacturing Company, Newton 58, Mass.
281	Rea Magnet Wire Company, Inc., Fort Wayne 4, Ind.
283	Remington Rand Inc., South Norwalk, Conn.
284	Remler Company, Ltd., San Francisco 10, Calif.
285	The Rola Company, Inc., Div. of The Muter Company, Cleveland 14, Ohio
286	The Ross Manufacturing Company, Burlington, Iowa
287	Walter L. Schott Company, Los Angeles 18, Calif.
289	J. P. Seeburg Corporation, Chicago 22, Ill.
291	Sentinel Radio Corporation, Evanston, Ill.
293	Sherron Electronics Company, Div. of Sherron Metallic Corp., Brooklyn 6, N. Y.
294	F. W. Sickles Division, Sub. of General Instrument Corp., Chicopee, Mass.
295	*Mark Simpson Manufacturing Co., Inc. Long Island City 3, N. Y.
296	*Solar Manufacturing Corporation, Los Angeles 58, Calif.
297	*Sonora Radio & Television Corp., Chicago 12, Ill.
299	*Sparton Radio-Television Division, The Sparks Withington Company, Jackson, Mich.
300	Speer Resistor Corporation, Saint Marys, Pa.
303	Sprague Electric Company, North Adams, Mass.
304	Stackpole Carbon Company, St. Marys 3, Pa.
305	*Standard Coil Products Co., Inc., Chicago 39, Ill.
306	Standard Transformer Corporation, Chicago 18, Ill.
307	Stewart-Warner Electric, Div. of Stewart-Warner Corporation, Chicago 14, Ill.
308	Stromberg-Carlson Company, Rochester 3, N. Y.
309	Stupakoff Ceramic & Mfg. Co., Latrobe, Pa.
310	Superior Tube Company, Norristown, Pa.
311	Supreme, Incorporated, Greenwood, Miss.
312	Sylvania Electric Products Inc., Emporium, Pa.
313	Synthane Corporation, Oaks, Pa.
318	*Thomas & Skinner Steel Products Co., Indianapolis 7, Ind.
320	Trav-Ler Radio Corporation, Chicago 6, Ill.
321	Triplett Electrical Instrument Co., Bluffton, Ohio
322	Tung-Sol Electric Inc., Newark 4, N. J.
323	United Electronics Company, Newark 2, N. J.
324	*United States Radium Corporation, New York 7, N. Y.
330	Wm. T. Wallace Mfg. Co., Inc., Peru, Ind.
331	Ward Products Corporation, Division of the Gabriel Company, Cleveland 3, Ohio
332	*Warwick Manufacturing Corporation, Chicago 44, Ill.
334	Wells-Gardner & Co., Chicago 39, Ill.
335	Wm. H. Welsh Co., Inc., Chicago 16, Ill.
336	Western Electric Company, Inc., New York 5, N. Y.
337	Westinghouse Electric Corporation, Baltimore 3, Md.
338	Weston Electrical Instrument Corp., Newark 5, N. J.
343	Zenith Radio Corporation, Chicago 39, Ill.
345	*The Astatic Corporation, Conneaut, Ohio
351	Symphonic Radio and Electronic Corp., Cambridge 42, Mass.
352	Magnetic Windings Division, Essex Wire Corporation, Easton, Penna.
356	*R. Prescott & Son, Inc., Keeseville, N. Y.
357	*Teleradio Engineering Corporation, Wilkes Barre, Pa.
360	*Gavitt Mfg. Co., Inc., Brookfield, Mass.
366	New York Transformer Co., Inc., Alpha, N. J.
367	National Moldite Company, Hillside 5, N. J.
369	*Stoddart Aircraft Radio Co., Hollywood 38, Calif
370	*United-Carr Fastener Corporation, Cambridge 42, Mass.
371	*Best Manufacturing Co., Inc., Irvington 11, N. J.
372	*Holyoke Wire and Cable Corporation, Holyoke, Mass.
373	*Regal Electronics Corporation, New York 27, N. Y.
375	*Webster-Chicago Corporation, Chicago 39, Ill.
376	Hazeltine Electronics Corporation, Little Neck, L. I., N. Y.
380	*Radio Receptor Company, Inc., New York 11, N. Y.
381	*The Ucinite Company, Newtonville, Mass.
384	*Red Lion Cabinet Company, Red Lion, Pa.
385	*Dearborn Glass Company, Chicago 8, Ill.
391	Altec Lansing Corporation, Beverly Hills, Calif.
392	*The Wheeler Insulated Wire Company, Inc., Waterbury, 20, Conn.
394	*Foster Transformer Company, Cincinnati 23, Ohio
395	*Permoflux Corporation, Glendale 5, Calif.
396	General Cement Mfg. Co., Rockford, Ill.
397	The Workshop Associates Incorporated, Needham Heights 94, Mass.
402	Andrew Corporation, Chicago 19, Ill.
406	Wirt Company, Philadelphia 44, Pa.
409	British Industries Corporation, New York 13, N. Y.
411	Hardwick, Hindle, Inc., Newark 5, N. J.
412	*General Transformer Company, Homewood, Ill.
413	*Acme Electric Corporation, Cuba, N. Y.
418	*United Transformer Corporation, New York 13, N. Y.
423	North American Philips Company, Inc., New York 17, N. Y.

Code No.	Company
424	*Milwaukee Stamping Company, Milwaukee 14, Wis.
425	*Essex Electronics, Berkeley Heights, N. J.
427	Communication Measurements Laboratory, Inc., Plainfield, N. J.
430	Camburn, Inc., Woodside, Long Island, N. Y.
431	Waterman Products Company, Inc., Philadelphia 25, Pa.
433	Cleveland Electronics, Inc., Cleveland 3, Ohio
435	*Plastoid Corporation, Hamburg, N. J.
437	*Newcomb Audio Products Company, Hollywood 38, Calif.
438	The Gudeman Company, Chicago 10, Ill.
440	Cannon Electric Company, Los Angeles 31, Calif.
442	J-B-T Instruments, Inc., New Haven 8, Conn.
445	*Mississippi Products, Inc., Jackson, Miss.
446	Good-All Electric Mfg. Co., Ogallala, Nebr.
447	*Radionic Controls, Inc., Herrin, Ill.
448	*Radiomarine Corporation of America, New York 13, N. Y.
449	Wilder Manufacturing Corp., Herrin, Ill.
450	Columbus Process Co., Inc., Columbus, Ind.
452	Empire Coil Company, Inc., New Rochelle, N. Y.
454	Telequip Radio Company, Chicago 8, Ill.
457	Herlec Corporation, Sub. of Sprague Electric Co., Grafton, Wis.
461	Barker & Williamson, Inc., Upper Darby, Pa.
462	*Communications Company, Inc., Coral Gables 34, Fla.
464	*Q. L. C. Corporation, Summit, N. J.
465	Oxford Electric Corporation, Chicago 15, Ill.
466	Delco Radio Division, General Motors Corporation, Kokomo, Ind.
467	Grigsby-Allison Company, Inc., Arlington Heights, Ill
472	*Pyramid Electric Company, North Bergen, N. J.
474	Special Products Company, Silver Spring, Md.
475	*Glass Products Company, Chicago 37, Ill.
479	Natvar Corporation, Woodbridge, N. J.
481	Harnett Electric Corporation, Port Washington, N. Y.
482	Rada Products Co., Chicago 12, Ill.
484	*Shurite Meters (J-B-T Instruments, Inc.), New Haven 8, Conn.
489	*Radio Television Products Corp., Grass Lake, Mich.
494	Fidelity Products Co., Inc., So. Orange, N. J.
501	Standard Piezo Company, Carlisle, Pa.
503	Caledonia Electronics & Transformer Corp., Caledonia, N. Y.
504	The James Knights Company, Sandwich, Ill.
505	Precision Apparatus Company, Inc., Elmhurst, L. I., N. Y.
507	John Volkert Metal Stampings, Inc., Queens Village, Long Island, N. Y.
508	The Hickok Electrical Instrument Co., Cleveland 8, O.
514	*Audio Electric Company, Chicago 26, Ill.
515	*Electronics Components Corporation, Chicago 10, Ill.
516	United Condenser Corporation, New York 54, N. Y.
517	Audak Company, Inc., New York 18, N. Y.
518	*Sampson Electric Products Co., Clinton, N. C.
520	Schneider & Marquard, Inc., Brooklyn 17, N. Y.
524	Triwec Transformer Company, Chicago 18, Ill.
525	Crucible Steel Company of America, New York 17, N. Y.
527	Valpey Crystal Corporation, Holliston, Mass.
529	Wheeler Laboratories, Inc., Great Neck, N. Y.
530	Clippard Instrument Laboratory, Inc., Cincinnati 14, Ohio
532	*Ward Leonard Electric Co., Mount Vernon, N. Y.
535	Hedco Manufacturing Corporation, Chicago 10, Ill.
536	Tel-Instrument Co., Inc., East Rutherford, New Jersey
539	Powdered Metal Products Corporation of America, Franklin Park, Ill.
540	*Radio Industries, Inc., Chicago 40, Ill.
541	Industrial Television, Inc., Clifton, N. J.
547	*Anaconda Wire & Cable Company, Hastings-On-Hudson 6, N. Y.
548	*B. J. Toegel, Inc., Plainfield, N. J.
549	*Mid-West Coil & Transformer Co., Chicago 14, Ill.
550	*Standard Winding Company, Newburgh, N. Y.
551	American Television & Radio Co., St. Paul 1, Minn.
552	Otis Radio & Electric Corp., Hawarden, Iowa
553	*Wesco Electric Company, Inc., Chicago 30, Ill.
554	American Phenolic Corporation, Chicago 50, Ill.
555	*Waldom Electronics, Inc., Chicago 10, Ill.
556	*The Halldorson Company, Chicago 40, Ill.
557	Electronic Products Company, Mt. Vernon, N. Y.
559	Lyman Electronic Corporation, Springfield, Mass.
562	Polarad Electronics Corporation, Brooklyn 11, N. Y.
563	J. W. Davis & Company, Dallas 9, Texas
569	*Electrical Utilities Company, La Salle, Ill.
570	*Leonard Electric Products Co., Inc., Brooklyn 32, N. Y.
572	*F. & V. Coil Winding Corporation, Brooklyn 5, N. J.
573	Alcon Metal Products, Inc., Chicago 47, Ill.
574	*Stanwyck Winding Company, Newburgh, New York
575	*Heppner Manufacturing Company, Round Lake, Ill.
577	LaPointe Electronics Inc., Rockville, Conn.
579	Belden Manufacturing Company, Chicago 44, Ill.
580	Rowe Industries, Toledo 9, Ohio
581	*Aircraft-Marine Products, Inc., Harrisburg, Pa.
583	Tele King Corporation, New York 1, N. Y.
584	W. M. C. Inc., Chicago 47, Ill.
585	*American Insulator Corp., New Freedom, Penna.
586	Drake Manufacturing Company, Chicago 22, Ill.
587	Radio Specialty Manufacturing Co., Portland 14, Ore.
588	Barnes Metal Products Company, Chicago 23, Ill.
589	David Bogen Co., Inc., New York 12, N. Y.
590	Shure Brothers, Inc., Chicago 10, Ill.
592	Perfection Electric Company, Chicago 16, Ill.
593	Kip Electronics Corporation, New York 14, N. Y.
596	Gramer Transformer Corporation, Chicago 39, Ill.
597	Stevens Wire Insulating Company, Chicago 39, Ill.
599	*Elco Corporation, Philadelphia 40, Pa.
603	*Eltran Corp., St. Anne, Ill.
604	The Staver Company Incorporated, Bay Shore, L. I.
606	Woodward-Schumacher Electric Corporation, Chicago 22, Ill.
607	Consolidated Wire & Associated Companies, Chicago 16, Ill.
608	*TELvision Laboratories, Inc., Chicago 44, Ill.
609	Markel Electric Products, Inc., Buffalo 3, N. Y.
610	Carter Parts Company, Chicago 10, Ill.
613	*Star Products Company, Chicago 16, Ill.
614	Simpson Electric Company, Chicago 44, Ill.
616	Illinois Condenser Co., Chicago 22, Ill.
617	RAM Electronics, Inc., Irvington-On-Hudson, N. Y.
618	*TV Products Corporation, Paterson 3, N. J.
620	Kay Electric Company, Pine Brook, N. J.
621	*Zenith Optical Company, Huntington 19, W. Va.
623	Anchor Radio Corporation, Chicago 23, Ill.
624	Surprenant Mfg. Co., Boston 8, Mass.
628	*Davis Electric Company, Cape Girardeau, Mo.
629	*Anchor Plastics Company, Inc., New York 13, N. Y.
631	Pickering and Company, Inc., Oceanside, N. Y.
632	*El-Rad Manufacturing Co., Chicago 13, Ill.
633	American Television, Inc., Chicago 5, Ill.
634	*Todd Products Co., Inc., Mt. Vernon, N. Y.
635	*Todd-Tran Corp., Mt. Vernon, N. Y.
636	Sheldon Electric Company, Div. of Allied Electric Products, Inc., Irvington 11, N. J.
637	Central Coil Company, Inc., Indianapolis 22, Ind.
638	Industrial Development Engineering Associates, Inc., Indianapolis 4, Ind.
639	Johnson & Hoffman Manufacturing Co., Mineola, N. Y.
642	Mycalex Corporation of America, Clifton, N. J.
643	National Aeronautical Corporation, Ambler, Pa.
644	General Railway Signal Company, Rochester 2, N. Y.
647	American Structural Products Co., Sub. of Owens-Illinois Glass Co., Toledo 1, Ohio
648	*American Radionic Co., Inc., Brooklyn 17, N. Y.
649	Electro-Voice, Inc., Buchanan, Michigan
653	Wind Turbine Company, West Chester, Pa.
654	Square Root Manufacturing Company, Yonkers 2, N. Y.
655	J. A. Maurer, Inc., Long Island City 1, N. Y.
656	Orsyd Company, Detroit 10, Mich.
657	Lowell Manufacturing Company, St. Louis 17, Mo.
658	Sangamo Electric Company, Springfield, Ill.
659	John R. Hollingsworth Corporation, Clifton Heights, Pa.
662	Weller Electric Corporation, Easton, Pa.
666	Winsted Division, Hudson Wire Company, Winsted, Conn.
668	*Standard Electrical Products Co., Dayton 3, Ohio
670	Glaser-Steers Corporation, Belleville 9, N. J.
671	*Lytle Engineering & Mfg. Co., Chicago 25, Ill.
672	Thomas Electronics, Inc., Passaic, N. J.
674	Shoup Engineering Company, Chicago 16, Ill.
677	*Rogers Electronic Corp., New York 12, N. Y.
678	Rhode Island Insulated Wire Co., Inc., Cranston, R. I.
679	*Tech-Master Products Company, New York 13, N. Y.
680	Conrac, Incorporated, Glendora, Calif.
681	American Lava Corporation, Chattanooga 5, Tenn.
682	*Electrical Windings, Inc., Chicago 39, Ill.
683	Wright Zimmerman, Inc., New Brighton, Minn.
684	*Sarkes Tarzian, Inc., Bloomington, Ind.
685	General Ceramics and Steatite Corp., Keasbey, N. J.
686	H. S. Martin & Company, Evanston, Ill.
687	*Hillburn Electronic Products Co., Brooklyn 22, N. Y.
688	*Trad Television Corporation, Asbury Park, N. J.
690	*Ticon Inc., Bridgeport, Conn.
692	CELCO (Constantine Engineering Laboratories Co.), Mahwah, N. J.

Code No.	Company
693	Multi-Tron Laboratory, Chicago 44, Ill.
694	Standard Electronics Corporation, New York 18, N. Y.
695	Basler Electric Company, Highland, Ill.
696	The Turner Company, Cedar Rapids, Ia.
697	*Phalo Plastics Corporation, Worcester 8, Mass.
698	Sheffco Manufacturing Co., Palisades Park, N. J.
699	Keystone Electronics Company, Stamford, Conn.
700	The Radion Corporation, Chicago 22, Ill.
701	Forbes & Wagner, Inc., Silver Creek, N. Y.
702	Radio Apparatus Corporation, Indianapolis 4, Ind.
703	Product Development Co., Inc., Arlington, N. J.
704	Cosmic Radio Corporation, New York 59, N. Y.
705	*Ajax Condenser Co., Inc., Chicago 14, Ill.
706	Pioneer Electronics Corporation, Santa Monica, Calif.
707	*Anchor Electronics Inc., Union City, N. J.
708	Bell Sound Systems, Inc., Columbus 7, Ohio
710	*Standard Condenser Company, Chicago 47, Ill.
711	*Sampsel Time Control, Inc., Spring Valley, Ill.
712	*Control Corporation, Minneapolis 14, Minn.
713	Taylor Tubes, Inc., Chicago 47, Ill.
714	General Vacuum Tube Corp., Ardsley, N. Y.
715	Technology Instrument Corporation, Acton, Mass.
717	Arthur Ansley Manufacturing Co., Doylestown, Pa.
719	Carbonneau Industries, Inc., Grand Rapids 2, Mich.
720	Methode Manufacturing Corp., Chicago 47, Ill.
721	*Rollan Electric Co., Chicago 19, Ill.
722	Milwaukee Resistor Co., Milwaukee 4, Wis.
723	Northwest Plastics, Inc., Saint Paul, Minn.
724	Jeffers Electronics Division, Speer Carbon Company, Dubois, Penna.
725	Copperweld Steel Company, Glassport, Pa.
726	Penn Television Products Co., Philadelphia 34, Pa.
727	*Rieder Bros., Philadelphia 34, Pa.
728	*Homecraft Mfg. Corporation, Newark 5, N. J.
729	*The American Woodworking Co., West Haven 16, Conn.
730	Jersey Specialty Co., Inc., Little Falls, N. J.
732	Radio Materials Corporation, Chicago 13, Ill.
733	Alpha Metals, Inc., Jersey City 4, N. J.
734	Fretco Incorporated, Pittsburgh 13, Penna.
735	*The Formatic Company, Naugatuck, Conn.
736	*Paul & Beekman, Inc., Philadelphia 40, Pa.
737	Technical Appliance Corporation, Sherburne, N. Y.
738	Lewis and Kaufman, Ltd., Los Gatos, Calif.
739	Oak Electronics Company, Buffalo 3, N. Y.
740	Olympic Metal Products Company, Inc., Alpha, N. J.
741	The Whitney Blake Company, New Haven 14, Conn.
742	*Esquire Radio Corporation, Brooklyn 19, N. Y.
744	Hughes Aircraft Company, Culver City, Calif.
745	*Tempel Manufacturing Company, Chicago 26, Ill.
746	L. H. Frost & Company, Grand Rapids 2, Mich.
749	*National Electronics, Incorporated, Geneva, Ill.
750	Mosely Electronics, Overland 14, Mo.
752	Electronic Devices, Inc., Brooklyn 15, N. Y.
753	Redmond Company, Inc., Owosso, Mich.
754	*Permaglass, Incorporated, Genoa, Ohio
755	*Electronic Expediters, Chicago 1, Ill.
756	Universal Company, High Point, N C.
757	*Grand Transformers, Inc., Grand Haven, Mich.
758	*The Electrometric Co., Woodstock, Ill.
759	Grayburne Corporation, Yonkers, N. Y.
760	Co-Operative Industries, Inc., Chester, N. J.
761	*Planet Manufacturing Corp., Bloomfield, N. J.
762	Erca Tool Die & Stamping Co., Brooklyn 22, N. Y.
763	Electronics & Nucleonics, Inc., New York 1, N. Y.
765	Videon Electronic Corporation, Indianapolis 4, Ind.
766	Haydon Products Corporation, Brooklyn 15, N. Y.
767	Quincy Speaker Manufacturing Corp., Quincy, Ill.
768	Crest Laboratories, Incorporated, Rockaway Beach 93, N. Y.
769	National Electric Products Corp., Pittsburgh 30, Pa.
770	Stone City Machine & Tool Co., Bedford, Ind.
771	Penta Laboratories, Inc., Santa Barbara, Calif.
772	Muntz TV, Inc., Chicago 13, Ill.
773	*The Forest Electric Company, Forest Park, Ill.
774	Macon Electronics, Div. of York Radio & Television Corp., Decatur, Ill.
775	*Electro-Mechanical Products Corp., Riverhead, N. Y.
776	*Ogden Coil & Transformer Co., Chicago 12, Ill.
777	Laidman & Company, Chicago 22, Ill.
778	Rego Insulated Wire Co., Hoboken, N. J.
779	*Custom Parts Corporation, Mattituck, N. Y.
780	DeJur-Amsco Corporation, Long Island City, N. Y.
781	Vacuum Tube Products, Oceanside, Calif.
782	Spencer Kennedy Laboratories, Inc., Cambridge 39, Mass.
783	Eldico of New York, Inc., Douglaston, N. Y.
784	Johnson Electronics, Orlando, Fla.
785	*Worthco Corporation, Beverly Hills, Calif.
786	*Hinners-Galanek Radio Corporation, Long Island City 6, N. Y.
787	*Sonotone Corporation, Elmsford, N. Y.
788	Daystrom Electric Corporation, Poughkeepsie, N. Y.
789	McGregor Electronic Industries, Inc., McGregor, Ia.
790	Circuitron, Inc., Hoboken, N. J.
791	Hopkins Engineering Company Inc., Altadena, Calif.
792	Atlantic Wire & Cable Company, College Point 56, N. Y.
793	McIntosh Laboratory, Inc., Binghamton, N. Y.
794	Harmon-Kardon, Inc., New York 12, N. Y.
795	G & H Wood Products Company, Brooklyn 11, N. Y.
796	*Chicago Radionics Corporation, Chicago 14, Ill.
797	Vidaire Electronics Mfg. Co., Lynbrook, L. I.
798	*Supreme Transformer Corporation, Chicago 12, Ill.
799	*California Magnetic Control Corp., North Hollywood, Calif.
800	*Emerald Manufacturing Company, Chicago 30, Ill.
801	*Polytron Corporation, White Plains, N. Y.
802	Tempo TV Products Company, Los Angeles 33, Calif.
803	Microwave Associates, Inc., Boston 15, Mass.
804	*Union Electric & Manufacturing Co., Jersey City, N. J.
805	Morgan-Rhein, Inc., Orlando, Fla.
806	*Mark Electronics Inc., Newark 2, N. J.
807	*General Dry Batteries, Inc., Cleveland 7, O.
808	*Henald Manufacturing Co., St. Anne, Ill.
809	Varian Associates, Palo Alto, Calif.
810	Translite Electronics Corp., Chicago 39, Ill.
811	Continental Electronics Corp., Philadelphia 31, Penna.
812	*Bradley Laboratories, Inc., New Haven 11, Conn.
813	Adler Communications Laboratories, New Rochelle, N. Y.
814	Antenna & Mounting Hardware Co., Franklin Park, Ill.
815	San Fernando Electric Mfg. Co., San Fernando, Calif.
816	Dale Products, Inc., Columbus, Nebr.
817	Brubaker Manufacturing Company, Inc., Los Angeles 34, Calif.
818	*Tel-O-Tube Corporation of America, East Paterson, N. J.
819	Z & W Machine Products Inc., Cleveland 3, O.
820	*United Electronic Manufacturing Corp., Union City, N. J
821	Universal Vacuum Tube Corp., Yonkers 2, N. Y.
822	*Syntronic Instruments, Inc., Addison, Ill.
823	*Eureka Television and Tube Corp., Hawthorne, N. J.
824	*Victor Electronic Mfg. Co., Chicago 39, Ill.
825	*Thermador Electrical Mfg. Co., Los Angeles 22, Calif.
826	*Superior Transformer Corp., Chicago 47, Ill.
827	The Allen D. Cardwell Manufacturing Corp., Plainville, Conn.
828	Midland Manufacturing Co., Inc., Kansas City 15, Kan.
829	Radell Corporation, Santurce 34, P. R.
830	*Triad Transformer Corporation, Venice, Calif.
831	*Better Coils, Inc., Goodland, Ind.
832	McCoy Electronics Co., Mt. Holly Springs, Penna.

The following list, arranged numerically, are previous RTMA Code number assignments which do not appear in the 1953 listing.

NUMERICAL LIST

CODE NO.	COMPANY
103	Airadio, Incorporated, Stamford, Conn.
104	Aireon Manufacturing Corporation, Kansas City 15, Kan.
108	American Coil & Engineering Co., Chicago 22, Ill.
114	Ansley Radio Corporation, Long Island City 1, N. Y.
117	Arpin Manufacturing Co., Orange, N. J.
121	Bank's Manufacturing Company, Chicago 40, Ill.
123	Bell & Howell Company, Chicago 45, Ill.
127	The Benwood Linze Company, St. Louis 3, Missouri
129	Boonton Radio Corporation, Boonton, New Jersey
131	Browning Laboratories, Inc., Winchester, Mass.
136	Chicago Molded Products Corp., Chicago 51, Ill.
142	Colonial Radio Corporation, Buffalo 7, New York
143	Communication Equip. & Engineering Co., Chicago 44, Ill.
144	C. G. Conn Ltd., Federal Recorder Co., Elkhart, Ind.
145	Consolidated Radio Products Co., Chicago 10, Ill.
153	Crystal Research Laboratories, Inc., Hartford 3, Conn.
165	Electronic Corp. of America, New York 11, N. Y.
167	Electronic Laboratories, Incorporated, Indianapolis, Ind.
169	Electronic Specialty Co., Los Angeles 26, Calif.
180	Felt Products Mfg. Co., Chicago 7, Ill.
181	Finch Telecommunications, Inc., Passaic, N. J.
182	A. W. Franklin Mfg. Corp., Long Island City 1, N. Y.
183	Freed Radio Corporation, New York 13, N. Y.

CODE NO.	COMPANY
184	Billings S. Fuess, South Orange, N. J.
186	Garod Radio Corporation, Brooklyn 1, N. Y.
195	General Television & Radio Corporation, Chicago 51, Ill.
200	Olympic Radio & Television, Inc., Long Island City 1, N. Y.
201	Hammarlund Mfg., Co. Inc., New York 1, N. Y.
202	Harvey Radio Laboratories, Inc., Cambridge 38, Mass.
203	Harvey-Wells Electronics Inc., Southbridge, Mass.
206	Hewlett-Packard Company, Palo Alto, Calif.
208	Howard Radio Company, Chicago 13, Ill.
209	Hudson American Corp., New York 18, N. Y.
212	Industrial and Commercial Electronics, Belmont, Calif.
213	International Detrola Corporation, Detroit 6, Mich.
226	Kuthe Laboratories, Inc., Newark, N. J.
227	Lear, Incorporated, Piqua, Ohio
229	Kimble Glass Div., Owens-Illinois Glass Co., Toledo 1, Ohio
233	Maguire Industries Incorporated, Greenwich, Conn.
234	Majestic Radio & Television Corp., Chicago 32, Ill.
237	John Meck Industries, Inc., Plymouth, Indiana
241	Micro Switch Div., First Industrial Corporation, Freeport, Ill.
243	Minerva Corporation of America, New York 7, N. Y.
253	Oxford-Tartak Radio Corporation, Chicago 15, Ill.
255	Packard Manufacturing Corporation, Indianapolis 7, Ind.
256	Panelyte Div., St. Regis Co., New York 17, N. Y.
261	Philharmonic Radio Corporation, New York 21, N. Y.
263	Phonovision Corporation, Chicago 22, Ill.
265	Poray, Inc., Chicago 51, Ill.
266	Precision Specialities, Los Angeles 4, Calif.
268	Press Wireless Manufacturing Corporation, Long Island City, N. Y.
269	Quality Hardware and Machine Corporation, Chicago 28, Ill.
271	Radell Corporation, Indianapolis 5, Ind.
272	Radex Corporation, Chicago 22, Ill.
277	Radio Speakers, Inc., Chicago 16, Ill.
279	Pierce Wire Recorder Corporation, Evanston, Ill.
282	Rek-O-Kut Company, Inc., Long Island City 1, N. Y.
288	Screenmakers, Inc., New York 7, N. Y.
290	Selenium Corporation of America, Los Angeles 15, Calif.
292	Sheridan Electronics Corporation, Chicago 16, Ill.
298	Sound, Inc., Chicago 16, Ill.
301	Sperry Gyroscope Co., Div. of the Sperry Co., Great Neck, Long Island, N. Y.
314	Syracuse Ornamental Company, Syracuse 2, N. Y.
315	Technical Radio Company, San Francisco 3, Calif.
316	Telicon Corporation, New York 21, N. Y.
317	Templetone Radio Mfg. Corporation, New London, Conn.
319	Thordarson Electric Mfg., Div. Maguire Industries, Inc., Chicago 10, Ill.
325	United States Television Mfg. Corp., New York 23, N. Y.
326	Universal Microphone Company, Inglewood, Calif.
327	Universal Television System, Kansas City 8, Missouri
328	Utah Radio Products Company, Detroit 9, Mich.
329	Viewtone Television & Radio Corp., Brooklyn 1, N. Y.
333	Watterson Radio Manufacturing Corp., Dallas 1, Texas
339	Wilcox Electric Company, Inc., Kansas City 1, Missouri
340	Wilcox-Gay Corporation, Charlotte, Mich.
341	Winters & Crampton Corporation, Grandville, Mich.
342	The Zell Company, New York 12, N. Y.
344	Argus, Incorporated, Ann Arbor, Mich.
346	Madison Electrical Products Corp., Madison, N. J.
347	Tele-Tone Radio Corporation, Elizabeth 2, N. J.
348	Rayenergy Radio & Television Corp. of America, New York, N. Y.
349	Franklin Photographic Industries, Chicago 10, Ill.
350	American Transformer Co., Newark 5, N. J.
353	Gralnick Bros., Inc., Philadelphia 22, Pa.
354	Lewis Electronics, Los Gatos, Calif.
355	Boonton Molding Company, Boonton, N. J.
358	Cinaudagraph Div., Indiana Steel Products Co., Stamford, Conn.
359	Webster Electric Company, Racine, Wis.
361	Hartford Industries Inc., Jackson Heights, New York, N. Y.
362	National Vulcanized Fibre Co., Wilmington, Del.
363	Eastern Electronics Corporation, New Haven, Conn.
364	The Sillcocks-Miller Company, South Orange, N. J.
365	Industrial Synthetics Corporation, Irvington, N. J.
368	Santay Corporation, Chicago 24, Ill.
374	Harry A. Prock Cabinet Company, Glenside, Pa.
377	DeMornay-Budd, Incorporated, New York 51, N. Y.
378	Bachmann Bros. Inc., Philadelphia 24, Pa.
379	United Wood Specialty Mfg. Co., Fall River, Mass.
382	Waters Conley Company, Rochester, Minn.
383	Wilmak Corporation, Benton Harbor, Mich.
386	Arpee Products Co., Glendale, Calif.
387	Kyle Corporation, South Milwaukee, Wis.
388	Modern Electronic Company, Inc., New York 11, N. Y.
389	National Design Service, New York 6, N. Y.
390	Printloid Inc., New York 12, N. Y.
393	Western Gasket & Packing Company, Los Angeles 11, Calif.
398	Stamford Transformers, Inc., Stamford, Conn.
399	Industrial Electronic Corporation, Brooklyn 31, N. Y.
400	Noma Electric Corporation, New York 11, N. Y.
401	Wellmann Manufacturing Company, Los Angeles 46, Calif.
403	Super Electric Products Corp., Jersey City, N. J.
404	Lincoln Electronics Corporation, New York 19, N. Y.
405	Ohio Tool Company, Cleveland 11, Ohio
407	Radio Navigational Instrument Corp., New York 21, N. Y.
408	Mercury Equipment Company, Ashtabula, Ohio
410	Midwest Electric Products, Inc., Indianapolis 8, Ind.
414	Radiation Products, Inc., Los Angeles 15, Calif.
415	United Mfg. & Service Co., Milwaukee 2, Wis.
416	Lewyt Corporation, Brooklyn 11, N. Y.
417	Tone Products Corp. of America, New York 10, N. Y.
419	Radio Development & Research Corp., Jersey City, N. J.
420	Schrader Electronic & Coil Corp., Los Angeles 11, Calif.
421	Lee Radio Manufacturing Corporation, New Hyde Park, N. Y.
422	Crimp-Seal Products Co., Chicago 10, Ill.
426	E. W. McGrade Manufacturing Co., Kansas City 2, Mo.
428	Schulmerich Electronics, Inc., Sellerville, Pa.
429	Bernard Rice's Sons, Inc., New York 16, N. Y.
432	Premier Crystal Laboratories, Inc., New York 7, N. Y.
434	Electrical Reproduction Co., Chicago 22, Ill.
436	Adaptol Company, Brooklyn 13, N. Y.
439	Collins Radio Company, Cedar Rapids, Iowa
441	Gilner Manufacturing Company, Steger, Ill.
443	Quakertown Luggage Company, Philadelphia 47, Pa.
444	A. F. Smuckler & Co., New York 6, N. Y.
451	Vertrod Corporation, New York 17, N. Y.
453	Russell Electric Company, Chicago 10, Ill.
455	Dynavox Corporation, Long Island City 1, N. Y.
456	Fisher Radio Company, New York 17, N. Y.
458	General Anline & Film Corporation, New York 17, N. Y.
459	General Communication Company, Boston 15, Mass.
460	Dual Engineering Corporation, Chicago 22, Ill.
463	Testing Instruments, Inc., Dayton 2, Ohio
468	Cinaudagraph Speakers, Division of Aireon Manufacturing Corp., Kansas City 15, Kan.
469	Gem Phono Manufacturing, Inc., New York 19, N. Y.
470	Kings Electronics Company, Brooklyn 5, N. Y.
471	Precision Parts Company, Ann Arbor, Mich.
473	United Speakers, Inc., Los Angeles 23, Calif.
476	Airdesign, Incorporated, Upper Darby, Pa.
477	Electro-Tone Corporation, Hoboken, N. J.
483	Houston Radio & Television Co., Houston, Texas
485	Scott Radio Laboratories, Inc., Chicago 40, Ill.
486	Lectrovision, Inc., New Rochelle, N. Y.
493	Dormitzer Electric & Mfg. Corp., Boston 15, Mass.
498	Radio Mfg. Engineers, Inc., Peoria 6, Ill.
499	Speaker Corporation of Chicago 22, Ill
502	American Radio Hardware Co., Inc., Mt. Vernon, N. Y.
506	Micarata Fabricators, Inc., Chicago 40, Ill.
511	The Joyner Corporation, Chicago 44, Ill.
512	Electronic Associates, Inc., Long Branch, N. J.
519	American Volume Control Corporation, New York 6, N. Y.
523	Transmitter Equipment Mfg. Co., Inc., New York 14, N. Y.
528	Columbus Electronics Corporation, Yonkers, N. Y.
543	The Nielsen Television Corporation, Norwalk, Conn.
544	Stephens Mfg. Corporation, Culver City, Calif.
545	Electronic Enterprises, Inc., Newark 4, N. J.
558	Eagle Electronics, Inc., New York 13, N. Y.
560	Stark Sound Engineering Corporation, Fort Wayne, Ind.
565	Electrovox Company, Inc., East Orange, N. J.
566	Television Projects, Inc., Newark 2, N. J.
571	General Cable Corp., New York 17, N. Y.
578	The International Electronics Company, Philadelphia 30, Pa.
582	General Precision Equipment Corporation, New York 7, N. Y.
591	Crown Capacitor Corporation, Wrentham, Mass.
594	Kobzy Tool Company, Chicago 22, Ill.
598	Deluxe Coils, Inc., Wabash, Indiana
600	Ansley Radio & Television Inc., Trenton 9, N. J.
601	Engineering Services, Inc., Evansville 8, Ind.
602	Eastern Transformer Company, Inc., New York 11, N. Y.
605	Stanley Spring Mfg., Co., Chicago 12, Ill.
611	Holiday Specialties, Inc., New York 12, N. Y.
612	Radio Merchandise Sales, Inc., New York 55, N. Y.
615	Reynolds Metals Company, Louisville, Ky.
619	Bowers Battery and Spark Plug Co., Reading Pa.
622	Mifflinburg Body Works, Inc., Mifflinburg, Pa.
625	The Orsenigo Company, Inc., Westerly, R. I.
627	Churchill Cabinet Co., Chicago 47, Ill.
630	Magnetic Corp. of America, Chicago 22, Ill.
640	Northern Metal Products Company, Chicago 24, Ill.
641	Caliri Mfg. Co., West Orange, N. J.
645	Alamo Tel. & Radio Co., San Antonio, Texas
646	R. K. L. Electro Winding Corp., Delevan, N. Y.
650	Central Commercial Co., Chicago 4, Ill.
651	Jewel Radio Corporation, Long Island City 1, N. Y.
669	Advance Transformer Company, Chicago 40, Ill.
673	Ampro Corporation, Chicago 18, Ill.
675	Electronic Industries Inc., Springfield, Ohio
676	Penn Boiler and Burner Mfg. Corp., Lancaster, Pa.
689	Aladdin Radio Industries, Chicago, Ill.
709	The Rodefer Glass Company, Bellaire, Ohio
731	Central Transformer Company, Chicago 7, Ill.
743	Madisco, Inc., Philadelphia 24, Pa.
747	Altair Corporation, New York 13, N. Y.
748	Russell Speaker Co., Chicago 29, Ill.
764	The Danbury Transformer Corp., Danbury, Conn.

The PHOTOFACT Servicer

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The following service hints on Bendix receivers are brought to you through the courtesy of Bendix Radio, Division of Bendix Aviation Corporation, Baltimore 4, Maryland.

Models OAK3, 21K3, 21KD, 21T3, 21X3
Photofact Set 183, Folder 2

Oscillation -

Oscillation of the 6BQ7 in the tuner may be caused by improper spacing of the windings on coil L8. (The particular winding on coil L8 is the winding connected to pin 6 (plate) of the 6BQ7). Improper winding spacing adversely offsets loading of the 6BQ7. Coil windings should be closely spaced to assure proper operation.

High Frequency Hash -

This condition which may be experienced in some areas is due to the wide band response of the audio system. To remedy follow the steps outlined:

1. Adjust front oscillator slug (A14 thru A25, any one depending on channel setting), accessible by removing channel selector knob, counterclockwise, for best sound. Make certain that receiver has been operating for at least 15 minutes.

2. Tune ratio detector top slug (A12) for best sound.

Tube Substitution -

Type 6BZ7 tube may be used as a replacement for type 6BQ7. Type 6BK7 must not be used as a replacement.

UHF Strip Installation -

Incorrect installations of UHF strips may cause intermittent snow in the picture. Failure to assure proper alignment of the strip interconnecting pin is the most common cause of this condition, which results in grounding of the pin to the turret.

Parts List (Miscellaneous Section) -

The part numbers for the cabinets on Models 21KD and OAK3 are reversed. Cabinet for 21KD should be RH255119-1, and cabinet for OAK3 should be RH255118-2.

Code "A" -

Code "A" stamped on the chassis indicates the addition of a 680K ohm 2 watt resistor to the anode lead of the picture tube. This resistor is R117 in the Photofact Folder. Also on chassis Code "A" a .01 mfd. 600 volt capacitor is connected in parallel across R4 (Focus Control) and R118. These changes improve filtering of the high voltage in the event of internal arcing of the electrostatic focus picture tube.

Code "B" -

Code "B" stamped on the chassis of these models denotes that the circuit is altered to accommodate an electro-magnetic focus picture tube; and R97 (2200 ohm 2 watt resistor), has been removed from under the chassis to the terminal board in the high voltage cage.

Late Production -

Late production receivers have changed C63A and B to two separate .0047 mfd. + 10% 600 volt capacitors. These are part of the vertical integrating network.

Console Cabinet Casters -

Cabinet casters are available for all 21" console model cabinets. Part number for the caster is 275092.

Rear Panel Control Adjustment -

Adjustment of the controls on the rear panel can be simplified by using a standard metal capped pencil with eraser removed. The metal cap, if slipped over the control shaft will provide a snug fit and the pencil then serves as a handy adjustment tool.

Resistor Change -

In order to keep V5 and V6 well within their rating even in extreme cases of tolerance variations, the value of R46 has been increased from 270 ohms to a 2700 ohm 1 watt resistor.

Tuner Cover -

When replacing the tuner cover make sure the 110 volt AC leads are held aside. Failure to observe this precautionary measure may result in the tuner cover cutting the AC leads resulting in injury to the servicemen or damage to the set.

Models 753F, M, W
Photofact Set 199, Folder 3

Off-Auto-On Switch -

If set remains on regardless of position of Off-Auto-On switch, check to see if production jumper is still connected across lines to this switch. The jumper must be removed for proper switch operation.

Adjustment of Off-Auto-On switch can be performed as follows if the switch fails to operate in the "Auto" or "On" position.

1. Locate the slotted adjusting screw which is on the back of the clock just to the left of the lower mounting bolt for the switch assembly.

2. With a small screw driver turn this screw in the clockwise direction approximately 3/4 of a turn. (Take precaution not to over adjust this screw, to do so will not permit the switch to operator in the "Off" position).

Oscillator Failure -

Failure of oscillator, when receiver is turned to the low end of the band, may be corrected by substituting a lead 6-3/4 inches in length for the original one connecting pin 7 of the 12BE6 to the antenna section of the gang capacitor. Sets involved will only be those with serial numbers from 10,001 to 11,550.

* * *

The following service hints covering Stewart Warner Television receivers are brought to you through the courtesy of Stewart Warner Electric.

Improved Video Response

Model 9200 Series
Photofact Set 132, Folder 13

Model 9202 Series
Photofact Set 158, Folder 12, and Set 172, Folder 9

Model 9203 Series
Photofact Set 166, Folder 14

Model 9204 Series
Photofact Set 164, Folder 11

Model 9209 Series
Photofact Set 181, Folder 14

Model 9210 Series
Photofact Set 192, Folder 8

Model 9211 Series
Photofact Set 200, Folder 9

It is possible to further improve the picture quality on the listed models by utilizing the following peaking coils. Whenever it becomes necessary to replace a peaking coil on any of these receivers, it is suggested that the latest type be incorporated. Model 9202 receivers which contain the letter "N" in the SERIES coding, Model 9210 receivers which contain the letter "G" in the SERIES coding, and Model 9211 receivers which contain the letter "E" in the SERIES coding, already utilize these particular coils.

Models 9200 Series, 9204 Series, and 9209 Series.

Coils within M5. Coil (Series Peaking) connecting to junction of 1N64 crystal and 5 mmf. capacitor change to part number 520620. Coil (Shunt Peaking) connected to ground through 8.2 K ohm resistor change to part number 520985. Change L15 part number to 520689. Change L16 part number to 509342.

Model 9202 Series.

Coils within M5. Change series peaking coil to part number 520620. Change shunt peaking coil to part number 520985. Change L14 part number to 520689. Change L15 part number to 509342.

Model 9203-A

Coils within M6. Change series peaking coil to part number 520620. Change shunt peaking coil to part number 520985. Change L15 part number to 520689. Change L16 part number to 509342.

Model 9210 Series

Change L19 part number to 502620. Change L20 part number to 520985. Change L22 part number to 520689. Change L23 part number to 509342.

Model 9211 Series

Change L18 part number to 502620. Change L19 part number to 520985. Change L21 part number to 520689. Change L22 part number to 509342.

Electrostatic Charge

Model 9209 Series
Photofact Set 181, Folder 14

Due to the use of the metal 21" picture tube, several instances have been encountered where an electrostatic charge has been developed on ungrounded metal receiver components such as the nameplate, the speaker frame and the built-in antenna. In the case of the nameplate, a slight shock can be transmitted to the receiver operator. The voltage developed on the other two components becomes apparent as a typical snapping sound as the voltage discharges to a point of lower potential.

The coloring pigment on the black picture tube mask can also provide a high voltage leakage path, and may create a condition where it is possible to draw a slight charge through the safety glass or cabinet front. This condition exists only on receivers using a black mask and can be eliminated by grounding the mask at one of the mounting screws.

In all cases, grounding of the aforementioned items will provide a remedy. First ground the speaker frame by soldering a wire from one of the connectors to the frame itself. A standard wire should then be connected from one of the speaker mounting nuts to the lower mask mounting nut and then to the nameplate hinge mounting screw.

When the built-in antenna is connected for TV reception, it does not exhibit an arcing characteristic since there is a leakage path to discharge the voltage. However, when the built-in antenna is disconnected, one side of it should be connected to chassis ground. This can be conveniently accomplished by securing the built-in antenna lug under the speaker mounting nut.

After these components have been grounded, be sure to completely remove all dust from the picture tube face and also from the high voltage insulating sleeve.

Vertical Drift on 19 Tube TV Chassis

Some of these receivers are affected by a drift condition. This should not be confused with vertical instability due to electrical interference or weak signal. The drift becomes apparent after the set has been in operation some time. The picture may then start to roll vertically and this can generally be corrected by resetting the vertical hold control. Within a few minutes, it may be necessary to again reset this control and in general this amount of adjustment would suffice for that period of receiver operation. However, after the receiver had been shut off for any length of time, similar readjustment would again be required after it was turned on.

This unstable condition has been found to be characteristic of certain 6BL7 GT tubes and the only cure is to undertake tube replacement. Sylvania Electric has recently developed an improved version of this tube which will in nearly all cases provide the answer to this problem. This tube can be identified by a star adjacent to the code date on the base.

CORRECTION NOTICE

Philco Model 51-T1870
Photofact Set 135, Folder 10

Page 14 - Horizontal Sweep Circuit Adjustments.

Adjustment of B2 in strong signal areas should read as follows:

> NOTE: In strong signal areas, free from noise, the tendency of double triggering in the oscillator may be reduced by adjusting B2 until the rounded peak of the waveform is slightly lower than the pointed peak. The difference should be only slight, to prevent rendering the oscillator too insensitive.

FIELD EXPERIENCES

For every "Field Experience" published, we issue a certificate good for one PHOTOFACT Folder Set. Awards are issued at the time of publication. Since it is impossible to verify the accuracy of contributions, we cannot be responsible for either the diagnosis made of the receiver trouble, or the results which will be obtained by following the suggested repair routine. All contributions become the property of Howard W. Sams & Co., Inc.

CROSLEY Model 10-412MU
Photofact Set 114, Folder 3

Complaint: Set operated OK for a few minutes when first turned on. Raster would disappear.

Analysis and Repair: Removed chassis. Smoke from front end and B+ went to a higher than normal value. Found the 6W4 (Damper) had an intermittent short. Replaced 6W4.

Edward Jones
P. O. Box 495
Rahway, New Jersey

* * *

WESTINGHOUSE Model H303P4 (Ch. V-2153)
Photofact Set 89, Folder 16

Complaint: Severe Distortion.

Analysis: Checked tubes, coupling capacitors and filters. Checked all voltages except filament voltage. Finally bridged a new selenium rectifier across one in set. Distortion cleared up.

Repair: Replace selenium rectifier unit.

Paul S. Segars
107 6th Street, South
St. Petersburg, Fla.

* * *

MOTOROLA Model 10T2 (Ch. TS14B)
Photofact Set 92, Folder 4

Complaint: No raster, no sound.

Analysis and Repair: Replaced M1 and M2 (Selenium Rectifiers). Excessive current in B+ circuit. Filters checked OK. R86 had decreased in value to less than 2KΩ. Replaced R86 with proper value.

Howard Adams
627 Meadowbrook
Memphis, Tennessee

* * *

HALLICRAFTERS Model 17824
Photofact Set 155, Folder 8

Symptom: Picture tube slow to light up (raster), poor focus.

Cause: R77 (470K) in grid circuit of 6AU5GT (Horizontal Output) open. Replace R77.

Ken Churchill
Cass City Oil & Gas Co.
Cass City, Michigan

* * *

ADMIRAL (Models using cascode circuit tuner)

Complaint: Sudden fade in picture but sound appeared normal.

Analysis and Repair: Voltages appeared low in video amplifier tube (6AC7) during fade. Tracing B+ circuit lead to tuner where it was discovered that the 120 mmf. capacitor in series with the 23.1MC coil in the mixer plate was shorting. Replaced capacitor.

Ray Musick
Precision Electronix
Wichita, Kansas

* * *

Emerson Model 681, Series B
Photofact Set 128, Folder 6

The above set had good horizontal sync. Intermittently the picture was good. However, on occasion the picture would break up vertically so there was 1/2 of the center of the picture blacked out. The top 1/4 and the bottom 1/4 of the picture was normal, but the center 1/2 had no picture or brightness at normal brightness settings.

After much checking I found that the 6AC7 had an intermittent short. The sound had been normal and the top and bottom of the picture seemed to have normal video.

Changing the 6AC7 solved the problem.

Edward Jones
Rahway, New Jersey

* * *

"The Case of the Persistent Intermittent"

An officer in the Air Force sweated out his tour of duty in Europe eager to return to the United States and get in on this TV about which he had read. TV would be the life for him.

The engine of his plane, which he flew home, was barely cold before he had signed a contract, television set, antenna and all.

Soon the brand new installation was complete. The Colonel, pipe in hand, settled himself in his favorite easy chair to enjoy the life for which he had longed. His pleasure was short lived, however. Before his eyes was a picture with individual lines or groups of lines missing. Sometimes it appeared as though part of a frame were superimposed upon a complete frame. Seldom did the picture lose sync either vertical or horizontal. Sometimes the video would be missing in one or several irregularly spaced bands, one inch wide. Sometimes the set would operate perfectly for a week. When the trouble did occur it was in the afternoon, seldom at night.

During the first year the set was removed and bench tested several times. The set was always returned after no repairs and a perfect "bench" record. About this time I was to hear his tale of woe. Intermittently, during the past year I worked on the problem. Only last Saturday did I find the cure.

The interference or fault lasted only a few micro seconds. It did not appear to bother the sync. On this basis I concluded a coupling or bypass condenser in the video end was acting up.

The set was "benched" for test. After several hours with no results, I decided on the oven test. The chassis was covered with a cardboard box, then a blanket. I thus abused it as long as I dared without dripping the plastic off the wiring--no results.

Upon further experimentation, I discovered that I could duplicate the video "display" by flicking the antenna terminals with a screwdriver. I concluded the "interference" was external to the set and whatever it was, it was entering through the antenna system.

I was mystified by the afternoon cycle of interference. Neighbors were checked to determine any similar experience. The reports were negative.

All appliances in the house were checked. Each branch circuit in the house was cut off. The TV set was operated from another circuit in the house. The lead-in for the outside antenna was rerouted further away from a telephone drop. An ohmmeter was placed across the terminals of the 300Ω lead. Violent gyration of the antenna system led to negative conclusions.

An inside antenna was substituted for the outside one. The signal was weaker but the trouble was still there. (Each of the above tests was carried out for a long period of time because of the intermittent characteristics of the trouble.)

After prolonged consultation with myself I asked the question, "Could it be possible the trouble actually was in the old antenna system and this was radiating into the inside antennas".

I shorted the outside lead-in and grounded it. The set operated a week without a peep of interference.

The outside 300Ω line was removed and each side was placed across a storage battery. After a few seconds one side opened up! The "break" could not be seen by inspection so the lead was buzzed with high voltage--the "break" had closed up! One or two cycles more of high current made the "break" permanent.

Now it was revealed that the strands at the break were alternately broken about 1/4 inch apart. Part of the strands thus lapped each other by about 1/4 inch. Evidently in the afternoon the temperatures were high enough to expand the plastic and allow a make and break contact in the wind. At night the plastic tightened about the wires and made good contact.

The moral to this story is to short and ground out the suspected antenna when a temporary antenna is substituted!!

E. P. Eardley
936 Rose Lane
Falls Church, Va.

The PHOTOFACT Servicer

Vol. 21, Nos. 205 & 206 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ April 15, 1953

RECORD CHANGER IDENTIFICATION

Recently we have received letters requesting that we include the record changer make and model in Photofact Folders covering phono combinations.

In the Servicer included with Photofact Set 118 is a cross-reference listing of receiver makes and model to record changer used. This covered most combination receivers in Photofacts up to Set 100.

Starting with approximately Set 100 this information has been given on page one of the individual folders. In addition to listing the record changer used, reference is made to the Photofact set and folder number in which complete service information for that changer is given. Reference is also made to one of four Howard W. Sam's record changer manuals (CM-1, CM-2, CM-3 or CM-4) in which service data for that changer is included.

* * *

The following service hints covering Sentinel receivers are brought to you through the courtesy of Sentinel Radio Corporation.

Need For Continued Ratio Detector Readjustment To Correct For Distorted And/Or Weak Sound

Reason:
The need for continued readjustment of the ratio detector (discriminator) secondary may be due to increased leakage of the 10 MFD 25 volt electrolytic connected across the ratio detector output.

As this capacitor becomes more and more leaky, it changes the reflected impedance into the ratio detector tuned circuit and shifts it out of alignment. When this capacitor gets quite leaky, the secondary adjustment peaks the sound but does not give the proper alignment setting between the two buzz peaks as it should when the circuit is normal - if this capacitor is shorted it completely kills the audio.

Remedy:
Replace the leaky 10 MFD 25 volt capacitor. It will of course be necessary to adjust the ratio detector secondary for the best sound, between the two buzz peaks. This secondary adjustment screw is on top of the ratio detector shield can which is located on top of the chassis between the audio IF and the audio detector tubes.

Model 338
Photofact Set 122, Folder 9

Intermittant or noisy 1st or 2nd IF transformers

New types of IF transformers having changes illustrated below can be identified by a red dot of paint on either the top or bottom of the coil can.

Reason:
Warpage of the bakelite pieces on top and bottom of the silver mica capacitor plates, resulting in the capacitor becoming loose and intermittant.

Remedy:
IT IS NOT NECESSARY TO REPLACE THE IF TRANSFORMERS: Special metal clips Sentinel Part No. P-1010 which firmly clamp the bakelite pieces together are available.
This Can Be Done Without Removing The Coils From The Chassis.

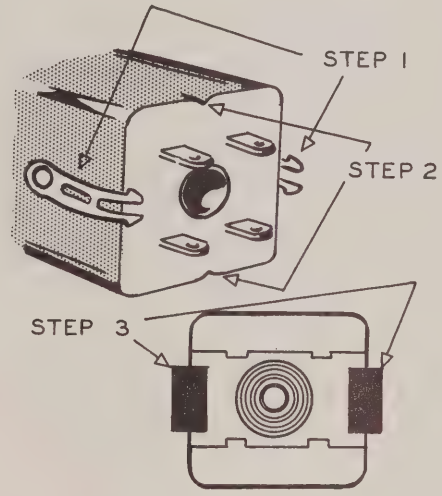


Figure 1

Fig. 1 shows the correct method of installing the special metal clips.
Remove only one IF coil can at a time - this will prevent damage to one coil while repairing the other.
Remove all tubes from the chassis.

Step 1
Loosen the coil can cover from the chassis by compressing the ends of the spring type mounting clips from the underside of the chassis and pushing outward until the can and coil are just free of the chassis.

Step 2
With a thin screwdriver inserted from the underside of the chassis thru opening located under-

neath the IF coil assembly straighten crimping on bottom edge of coil can, and gently remove coil can.

Step 3

Slide metal clips over both pieces of bakelite carefully.

Hold opposite side of coil while pushing in clip.

When replacing the coil can, line up the top of the coil form with the opening of the coil can before locking the coil can in place.

Models 1U447-A, 1U448-A, 1U449-A, 1U450-A
Photofact Set 178, Folder 10

Popping Sound When Sets Are Turned On And/Or Off.

Reason:

In 21" sets it may be due to electrostatic voltage build up between the picture tube and the built in antenna. The lack of outer dag coating on the picture tube creates this condition.

In the 17" sets it may be due to a similar electrostatic voltage build up between the mask and the picture tube.

Remedy:

21" sets - Remove the built in antenna. As the popping only occurs when the antenna is not connected to the set, it will cause trouble only when it is not needed.

17" sets - Make a ground connection between the mask and the chassis.

Of course there are other sources of high voltage popping, but when not traceable to common causes, check the above.

* * *

The following service hints covering Stromberg-Carlson television receivers are brought to you through the courtesy of Stromberg-Carlson Company.

Model 24 Series
Photofact Set 138, Folder 11

Picture Blanking Out at Maximum Contrast (Similar to poor AGC).

Check R130, 5600Ω, 1 watt resister for heating and increasing in value. Replace with (2) 12 KΩ, 1 watt resisters in parallel. Also check to be sure C90, .015 MFD capacitor has not shorted.

Model 421 Series
Photofact Set 170, Folder 13 (also Prod. Chge. Bul. 47 Set 181-1).

Jittery or Rubbery Picture

May be caused by R92 increasing in value to 50 KΩ or more.

Pin Cushioning

In the original developement of the 421 series, it was thought necessary to use correcting magnets to eliminate pin-cushioning on the sides of the pictures. After thorough checking of the production runs these magnets were eliminated. Stromberg-Carlson Service Department had a kit of these magnets available if they should be necessary when the picture tube is changed. These can be obtained by ordering Kit No. 81825.

Vertical Drift

Repeated failure of the 6BL7 "Vertical Blocking Oscillator and Vertical Output Tube" has dictated the following change on all chassis date coded 52-20-1. (See Photofact Set 198 Folder 14, Model 421 (Revised).

A 6C4 tube was added in an unused tube socket punchout on the front left hand corner of all 421 chassis to replace $\frac{1}{2}$ of the 6BL7 tube, i.e., the vertical blocking oscillator section of V15.

The lead going to Pin 4 of V15 was reconnected to Pin 6 of the 6C4.

The lead going to Pin 5 of V15 was reconnected to Pin 1 or Pin 5 of the 6C4.

The lead going to Pin 6 of V15 was reconnected to Pin 7 of the 6C4.

The filament Pins 3 and 4 of the 6C4 are connected to the filament string.

The unused Pins 4, 5 and 6 of the 6BL7 are grounded.

If an earlier 421 receiver is encountered having a 6BL7 causing vertical roll and not incorporating the 6C4, if is suggested that the 6BL7 be changed to one of the improved 6BL7's. These tubes can be identified by referring to the coding etched in the top of the glass envelope beneath the 6BL7 tube type designation. All of Sylvania's production of 6BL7's is now of this improved version so that tubes coded "E2E" or later, (F2E, G2E, H2E, etc.) are satisfactory replacements.

* * *

NEW PRODUCTS

Merit Coil and Transformer Corporation has announced two new HV Horizontal Output transformers.

HVO-X7 This unit has a new insulating material which encloses the high voltage windings, making it impervious to moisture and high humidity and forms a water-tight seal with the high voltage lead. Applications are the same as the HVO-7 with center tapped AGC or AFC winding.

HVO-11 This unit is a replacement for Zenith under-chassis units. Replaces Zenith part numbers S-16204, S-16566, S-17130, S-17245, S-17265, S-17435 and S-17927.

* * *

Correction Notice:

Westinghouse Models H-603C12, H-608C12 (Ch. V-2152-01 and V-2149-3)
Photofact Set 100 Folder 14

Tube Placement Charts, Page 5
V1 (6AG5) and V3 (6C4) should be interchanged on both charts. V3 (6C4) should be the tube furthest toward the front of the chassis and V1 (6AG5) should be at the back of the tuner. Tubes are shown in proper location on photo top view, page 3.

The PHOTOFACT Servicer

★ Published for all users of Howard W. Sams' Photofact Folders ★

IMPORTANT ANNOUNCEMENT

Because I value you as a supporter of PHOTOFACT, I feel a personal obligation to report to you on any major policy decisions we make.

As a PHOTOFACT user, you know the quality of our Service. Since we began way back in 1946, we've been doing what many in our industry said was impossible. We undertook nothing less than the publication of the world's finest Radio-TV Service Data based on actual analysis in our own laboratories of the receivers and equipment on which you required information. We've been delivering this data to you ever since, in complete, accurate, uniform PHOTOFACT Folders.

Hardly a month has passed which has not seen some new feature, some new advantage added to PHOTOFACT. Among the highlights you have applauded are:

1. Standard Notation Schematics (Standardized layouts and symbols)
2. Production Change Bulletins
3. Alignment Frequencies on Schematic & Radio Photographs
4. Voltages on Schematic
5. Waveforms on Schematic
6. Tube locating key on Tube Placement Chart
7. Showing Color Code of Transformer Leads
8. Orientation of Tube Placement Charts
9. Fuses on Tube Placement Charts
10. Tube Failure Check Chart
11. Servicing in the Field
12. Trouble Shooting Aids

As we've built the quality and practical usefulness of PHOTOFACT, always spurred on by your fine support and approval, our costs have steadily gone up. Since 1946, our engineering expense alone has risen 42%. Paper costs have gone up 32% and our overall operating costs have increased 26% since we began.

When we started in 1946, we set a price of $1.50 per Set of PHOTOFACT Folders. TO THIS DAY THAT PRICE HAS NOT BEEN RAISED -- in spite of soaring costs, -- in spite of expensive improvements in the Service, and -- in spite of the fact that we alone of all producers in our field have not asked for a price increase.

I have consistently resisted all pressure and recommendations for a price advance. However, it has been apparent for well over two years that we could not go on indefinitely delivering full value at the old price. We were confronted with the necessity for cutting either the content or the quality of the Service.

So we decided to ask our customers what to do. A recent sampling of 2,000 PHOTOFACT users has given us the clear-cut answer: They want the same content, the same completeness, the same advantages they get now -- and they're willing to pay more for it.

I've been truly impressed by this loyalty and understanding. I am confident we can continue to give you the best at a very minimum increase in price.

Please accept my heartfelt personal thanks for your past support and friendship. I pledge you my very best in the form of ever-better, ever-more valuable PHOTOFACT Folders to merit your continued support.

Howard W. Sams

The PHOTOFACT Servicer

Vol. 20, Nos. 199 & 200 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ March 1, 1953

To my Photofact Friends:

This, Photofact Folder Set No. 200, marks the completion of what we like to refer to as our "2nd Century" in the business of supplying repair and maintenance information to the electronic service field.

We are naturally proud of the relative degree of success which has rewarded our efforts, but we are even more proud that we have merited the loyalty and support which has made that success possible. Every step forward, each improvement in quality or scope of a service is accompanied by difficulties and problems. Sometimes they are technical, often they are economic, and frequently, just plain human, and in the first and second "centuries" of our existence we've had some dillies. In working out their solutions, on many occasions with your help, we like to feel that we are making a not entirely selfish contribution to the general betterment of our mutual interests.

It is, then, in a spirit of genuine humility, that we express our gratitude for opportunities to serve in the past, and our desire to seek out and solve to the best of our ability, the challenges inherent in the future of a phenomenally expanding industry.

Howard W. Sams

ANOTHER TV PHOTOFACT FOLDER ADDITION

Recently a new feature incorporated in TV PHOTOFACT Folders was announced. This was "Servicing in the Field". Appearing in most TV PHOTOFACT Folders, starting with Set 200, will be another valuable addition "Trouble-Shooting Aids".

"Trouble-Shooting Aids" will include: an individual trouble-shooting guide that gives symptoms--what to check for--which waveforms shown on the schematic may be affected--photographs of the picture as it would appear with specific troubles--plus a brief description of new, or unusual, circuits incorporated in the chassis.

The additional engineering and compilation required to produce this feature makes it impossible to expand our facilities to include "Trouble-Shooting Aids" immediately in all TV PHOTOFACT Folders, but we intend to include it as part of every TV Folder as soon as possible.

CORRECTION NOTICE

Firestone Models 13-G-51, 13-G-52.

Photofact Set 193, Folder 4

Page 13--T1, power transformer--Merit replacement should be P-3070.

T2, horizontal output transformer--Merit replacement should be HV0-10.

FIELD EXPERIENCES

For every "Field Experience" published, we issue a certificate good for one PHOTOFACT Folder Set. Awards are issued at the time of publication. Since it is impossible to verify the accuracy of contributions, we cannot be responsible for either the diagnosis made of the receiver trouble, or the results which will be obtained by following the suggested repair routine. All contributions become the property of Howard W. Sams & Co., Inc.

EMERSON Model 676F (Ch. 120143B)
Photofact Set 148, Folder 6 and
Prod. Chge. Bul. 50 - Set 184, Folder 1

Complaint: Unable to hold picture vertically.

Cause and Remedy: C28 (.25 mfd. capacitor) in AGC circuit open. Replaced C28 with recommended unit.

F. Loewy
Ace Radio-Television Service
19 South 3rd Street
Phoenix, Arizona

* * *

TELE-TONE Model TV-323 (Ch. TAM)
Photofact Set 124, Folder 11

Complaint: No raster, no sound.

Cause: The 6BN6 (Audio Detector-Aduio Amplifier) plate voltage is supplied from the 25W4 (Damper) cathode. The HV transformer was intermittently shorting, therefore, no high voltage or B+ boost voltage.

Remedy: Replaced Horizontal Output (HV) transformer with recommended unit.

Harlan Bercovici
3322 N. 48th Ave.
Omaha 4, Nebraska

* * *

OLDSMOBILE Model 982544
Photofact Set 96, Folder 7

Complaint: Set played perfectly in warm weather. In very cold weather (approximately zero degrees) the set would vary in volume in bursts, or be very weak for first 15 to 20 minutes of playing time. It would then go to full volume and play fine.

Analysis and Repair: The trouble was found to be in the second IF transformer. The RF bypass capacitor inside the can was found to check very low resistance when cold, thus shorting the high side of volume control to ground. Replaced capacitor with 50 mmf. mica.

Glen A. Brink
2530 Pine Street
Boulder, Colorado

BOOK REVIEWS

Basic Electronic Test Instruments
by Rufus P. Turner

Rinehart Books, Inc.
232 Maidson Avenue
New York, New York
254 pages - $4.00

This book, treating many of the test instruments available to the electronics field, is of particular interest to the beginning technician since it covers in excellent fashion, the basic measurement principles.

Emphasis is placed on instrument design and construction with much useful data on kits and shop-built equipment.

The technician will be aided in his selection of new shop equipment as the book classifies and catalogues many instrument functions by explaining principles and application. Because of the ever increasing number of new instruments and their growing importance to the successful shop operator, a book such as this becomes a valuable guide.

For those interested in television we recommend "How to Understand and Use TV Test Instruments" (TN2) by Milton S. Kiver--a Howard W. Sams PHOTOFACT Publication--available at your parts distributor--price $3.00.

The PHOTOFACT Servicer

Vol. 20, Nos. 197 & 198 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ February 15, 1953

NEW PARTICIPANT

It is our pleasure to announce a new participant in Photofact activities. The J. W. Miller Company, Los Angeles, California. Their replacement parts will be listed in the RF-IF coil section.

* * *

The following service hints covering RCA Victor Television receivers are brought to you through the courtesy of Radio Corporation of America.

RCA Victor, Models 17T200, 17T201, 17T202, 17T211, 17T220, 21T208, 21T217, 21T218, 21T227, 21T228, 21T229 (Ch. KCS72)
Photofact Set 184, Folder 12

WEAK SIGNAL AREA OPERATION

In weak signal areas, noisy sound may be experienced when receiving signals of 20 microvolts or less. Assuming that the receiver is in proper alignment, the following suggestions may result in discernible improvement.

1. Watch the picture and from the top of the chassis, turn A3 one-half to one turn clockwise to improve sound. Adjustment of A3 should not weaken or decrease picture contrast.

2. One high channels, a slight improvement in both picture and sound may be obtained by retouching the RF tuner antenna trimmer A16, located between the 6CB6 RF tube and the antenna matching transformer unit.

3. In some cases, retouching the tuning of L29 sound IF transformer may improve sound.

EXTENDED FINE TUNING RANGE

The fine tuning range of the local oscillator circuit has been extended in the KRK8D RF tuner. This feature allows optimum fringe area performance, permitting receiver adjustment so that the picture carrier may be located at the most advantageous point on the slope of IF response curve to meet the requirements of weak signal receiving conditions.

The additional flexibility in receiver operation also results in other advantages. It is possible to achieve more attenuation for the adjacent picture channel, compensation for transmitters with more than normal peaking, reduced service calls due to oscillator drift changing picture and sound carrier IF signal ratio, and greater convenience in UHF operation.

As a result of this extended range, fine tuning may seem somewhat more critical to adjust than was previously the case with other receivers. No difficulty should be experienced as a result of this sharpness of tuning. However, it may require a conscious change in habit for those who have become accustomed to conventional range fine tuning controls.

EXTENDED HORIZONTAL HOLD RANGE

Similarily, the front panel horizontal hold control range has been increased. This adjustment, because of the synchroguide horizontal oscillator characteristics, is in no way critical; however, the receiver may lose horizontal sync at the extremes of control rotation. This is not necessarily an indication of faulty horizontal oscillator operation, and should not be mistaken as such. This results from allowing the user greater control over the receiver and permitting him to compensate for horizontal oscillator drift by a front panel adjustment rather than a service adjustment on the receiver chassis rear apron.

AGC ADJUSTMENT

The correct AGC adjustment is important in obtaining the best performance from the receiver. Adequate picture contrast may also be difficult to obtain if the AGC control is not properly adjusted, in as much as the AGC control setting determines the IF signal voltage level appearing at the picture second detector. In medium and strong signal areas, this adjustment should be made on the strongest signal to avoid receiver overload. In weak signal areas, the maximum clockwise adjustment which gives best signal-to-noise ratio (minimum snow) may be preferred.

ION TRAP ADJUSTMENT

Ion trap adjustment, especially in weak signal areas, should not be overlooked as a means of obtaining increased contrast. The proper setting of the ion trap magnet depends somewhat upon the brightness control position used for best picture. A minor readjustment for maximum brightness may result in an improved picture in weak signal areas when receivers have previously been adjusted for operation on stronger signals.

* * *

RCA Victor, Model 9T57
Photofact Set 122, Folder 8

An interference pattern consisting of narrow vertical bars at the left-hand side of the raster, may be the result of internal corona, or arcing, within the 4.7 mmf. capacitor (C97) located in the plate circuit of the horizontal sweep output tube.

This interference may be mistaken for Barkhausen oscillation, but none of the normal Barkhausen preventative methods, such as adjusting the drive, placing a magnet over the 6BG6, etc., will be effective in eliminating the interference.

If such a condition is encountered, the capacitor should be replaced.

* * *

RF TUNERS

The attached information lists the differences between the various types of KRK2, KRK5, KRK7 and KRK8 series RF tuners. This information should be helpful in adapting one type of unit to another in event the correct type is not available.

KRK2 SERIES TUNERS

Receiver Model	RF Unit	Detent Stock No.	Conv. Trans. Cap.
621TS	KRK2	71463 (Short)	62 mmf.
630TS	KRK2	71463 (Short)	68 mmf.
630TCS	KRK2	71463 (Short)	68 mmf.
641TV	KRK2	71463 (Short)	68 mmf.
648PTK	KRK2A	71463 (Short)	68 mmf.
648PV	KRK2A	71463 (Short)	68 mmf.
721TS	KRK2B-1	72743 (Long)	62 mmf.
721TCS	KRK2B-1	72743 (Long)	62 mmf.
730TV1 & 2	KRK2B-1	72743 (Long)	62 mmf.
741PCS	KRK2A	71463 (Short)	68 mmf.
8TS30	KRK2	72743(Long)	68 mmf.
8PCS41	KRK2A	71463 (Short)	68 mmf.
8TV41	KRK2	71463 (Short)	68 mmf.
9PC41	KRK2A	71463 (Short)	68 mmf.

Note 1. Converter transformers using 62 mmf. capacitors are aligned on the primary side to 22.8 mc and are recognized by a painted dot on top. All others are aligned to 21.8 mc.

Note 2. There is no difference between the KRK2 and the KRK2A, except that "2A" unit is used in the projection receivers.

Note 3. Using the 621TS (KRK2) RF unit in the 630TS or 8TS30 without the modification indicated may result in IF oscillation. Using the 630TS (KRK2) RF unit in the 621TS without modification indicated may result in insufficient sound.

Note 4. The KRK2 unit can be changed to a KRK-2B-1 by changing the detent, tap on converter transformer, and converter shunt capacitor as listed above. All other parts are identical.

KRK5 AND KRK7 SERIES TUNERS

Receiver Model	RF Unit	Front Plate	Chan. Sel. Shaft	Actuating Shaft
8T241	KRK5	73436	73437	73439
8TV321-3	KRK5	73436	73437	73439
8T270	KRK5A	74166	74168	74167
8TK320	KRK5A	74166	74168	74167

KRK5 AND KRK7 SERIES TUNERS (Cont.)

Receiver Model	RF Unit	Front Plate	Chan. Sel. Shaft	Actuating Shaft
8TR29				
8TK29	KRK5	73436	73437	73439
9T20	KRK5	73436	73437	74439
9TC240	KRK5A	74166	74168	74167
9TC245-47-49	KRK5	73436	73437	73439
9T246	KRK7	74572	74573	74574
				74577
9T256	KRK7	74572	74573	74574
				74577
9T270				
9TC272-5	KRK5A	74166	74168	74167
9TW309	KRK5	73436	73437	73439
9TW333	KRK5	73436	73437	73439
9TW390	KRK5A	74166	74168	74167
T100	KRK7	74572	74573	74574
				74577
T120	KRK5	73436	73437	73439
T121	KRK5	73436	73437	73439
TC124-5-7	KRK5	73436	73437	73439
TA128	KRK5	73436	73437	73439
TA129	KRK5	73436	73437	73439
T164				
TC165-6-7-8	KRK5B	73436	73437	73439
TA169	KRK5B	73436	73437	73439
S1000	KRK5A	74166	74168	74167
6T72	KRK5B	73436	73437	73439

Note 1. KRK5 units may be converted to KRK5A by the replacement of the front plate, fine tuning shaft, and channel selector shaft. (Parts No. 73436, 73437 and 73439 are replaced by Parts No. 74166, 74167 and 74168).

Note 2. KRK5, KRK5A and KRK5B* units may be converted to KRK7 by discarding the following parts:

Stock Number	Description
73465	Belt, fine tuning
73441	Cam, fine tuning
73634	Nut, speed nut
73436	Front Plate and Bushing
73464	Pulley, fine tuning
14343	Retainer for chan. sel. shaft
73437	Shaft, channel sel.
73438	Shaft, fine tuning
73439	Shaft, actuating
73454	Shield for belt
73456	Spring, belt tension
74166**	Front Plate and Bushing
74167**	Shaft, actuating
74168**	Shaft, channel selector

and replace with the following Parts:

— - — - —

*The KRK5B unit is the same as the KRK5, except the inside front corner of the tuner shield is cut off diagonally.

**These parts used with KRK5A only.

Stock Number	Description
74572	Front Plate and Bushing
74573	Shaft, Channel Selector
74574	Shaft, Fine tuning and cam Assembly
74577	Spring Washer

* * *

KRK8 SERIES TUNERS

Receiver Model	RF Unit	Chan. Sel. Shaft	Fine Tuning Shaft & Cam	Front Plate
2T51-60	KRK8	75159	75160	--
2T81	KRK8	75159	75160	--
4T101	KRK8C	76133	76134	76754
4T141	KRK8C	76133	76134	76754
6T53-53-64-65-71-74-75-76	KRK8B	75159	75160	76135
6T84-86-87	KRK8B	75159	75160	76135
7T103-103B-104-104B-111B-112-112B-122-122B-123-123B-124-125B-132	KTK8B	75159	75160	76135
7T143	KRK8B	75159	75160	76153
9T57-77-79	KTK8B	75159	75160	76135
9T89	KRK8B	75159	75160	76135
9T105-126-128	KRK8B	75159	75160	76135
9T147	KRK8B	75159	75160	76135
16T152	KRK8B	75159	75160	76135
17T200-201-11-20	KRK8D	76519	76134	76518
21T208-17 18-27-28-29	KRK8D	76519	76134	76518

Note 1. Any KRK8 series RF tuner can be changed from a KRK8 to a KRK8B or 8C, or vice-versa, by installing the proper parts as listed above for each unit. All other parts are identical.

Note 2. Front plate No. 76135 is for the KRK11 tuner, but can be used on the KRK8B tuner.

Note 3. The KRK8D RF unit differs from the other units both mechanically and electrically. A KRK8D unit can be mechanically converted so as to be used in place of a KRK8, 8B or 8C provided that R12 is shorted out. However, the KRK8D has a wide range fine tuning control which might cause the fine tuning adjustment to be critical on non intercarrier receivers. In general, electrical conversions are not recommended due to the nature and amount of work involved.

OSCILLATOR SWITCH WAFERS

Some switches have a wax treated wafer. Heat, due to soldering operations, melts the wax and loosens the switch terminal on which the inductances are mounted. Operation of the switch causes variations in inductance during switching operations. Tuning will vary, depending on the direction of approach of the channel selector switch. This is the result of compression and expansion of the coils mounted on the loose switch contacts. Therefore, when repairing RF units, take care not to overheat the oscillator switch wafer. If the wafer is thus damaged, replacement of the wafer is the most practical solution.

* * *

RF UNIT OSCILLATOR TRACKING

The frequency of the RF unit oscillator is a function of the circuit inductance and capacity, and since the steps of inductance are fairly well fixed on Channels 7 to 12, inclusive, the only sizeable variables that are available are (1) the capacity and (2) Channel 13 inductance.

On KRK2, "C" consists of stray capacity, fine tuning capacity and (in some units only a "gimmic" a piece of insulated wire about 1/4 inch long) between the plate pins on the tube socket.

On KRK5, KRK7 and new KRK8, "C" is composed of stray capacity and a real adjustable capacitor.

On KRK2, "C" becomes less with a counter-clockwise rotation of the fine tuning control.

On KRK5, KRK7 and KRK8, a clockwise rotation of the fine tuning control gives less capacity.

To properly track an RF unit oscillator on the high channels, the following process may prove helpful:

1. Make sure that the adjustment screws for Channels 7 to 12, inclusive are spaced about 1/32 of an inch (1-1/2 turns from full in position) away from the rivets holding the inductance.

2. Tune for correct Channel 13 oscillator frequency by using the readily available adjustments for the purpose (a capacity trimmer on the KRK8 and an inductance slug on the KRK5.)

3. Without moving the fine tuning control, turn the detent to Channel 7 position and note the oscillator frequency.

4. If the noted frequency is higher than it should be, the Channel 13 capacity should be increased and the Channel 13 inductance should be decreased. Go back to Channel 13 and make the necessary changes to give both the correct frequency and an approximation of tracking correction. See Chart following.

5. If, on the other hand, the Channel 7 oscillator frequency is lower than it should be, the Channel 13 capacity should be decreased and the inductance increased. See Chart following.

KRK2

To Increase Channel 13 Capacity	To Decrease Channel 13 Capacity
1. Pick oscillator tube to give lower frequency.	1. Pick oscillator tube to give higher frequency.
2. Add a "gimmic" between oscillator tube socket plate pins or move the existing "gimmic" closer. (Use a production sample for reference--some units already have a "gimmic.")	2. Move "gimmic" away from plate pins.
3. Check cross feed capacitors for correctness of value.	3. Check cross feed capacitors for value.
To Decrease Channel 13 Inductance.	To Increase Channel 13 Inductance
The Channel 13 slugs are brass and normally inserted through the coil. If the slug screws stick out about 3/8 of an inch, they are in their minimum inductance position and any tuning, either in or out, gives a change toward the maximum inductance position.	
1. Move Channel 13 slug in if the stud protrudes 3/8 of an inch, or less. Move out if they protrude more than 3/8 of an inch.	1. Move Channel 13 slug out if the stud protrudes 3/8 of an inch, or less. Move in if they protrude more than 3/8 of an inch.

KRK5 AND KRK7

To Increase Channel 13 Inductance.	To Decrease Channel 13 Inductance.
1. Screw brass slug out of coils connected to plates of 6J6 (Osc.).	1. Screw brass slug into coils connected to plates of 6J6 (Osc.).
These slugs are available from the bottom of the RF unit chassis and are normally cemented lightly.	

KRK8

To Increase Channel 13 Inductance.	To Decrease Channel 13 Inductance.
1. Screw brass slug out of coil.	1. Screw brass slug into coil.
This slug is available from front of unit only.	

On the KRK5, KRK7 and KRK8, the Channel 13 capacity adjustment is fairly obvious. Screwing the stud out gives less capacity; in, gives more capacity.

After the proper adjustments have been made to give oscillator tracking within 1.0 mc or so from 13 to 7, each channel can be individually aligned by using the available screw trimmers.

For field use in areas having two or more high channel stations, a slightly different approach may be taken:

1. If the highest high channel is aligned with the fine tuning centered and the lowest high channel calls for a clockwise rotation of the fine tuning control, Step 4 applies for KRK2 and Step 5 for all other units.

2. If the highest high channel is aligned with the fine tuning centered and the lowest high channel calls for a counter-clockwise rotation of the fine tuning, Step 5 applies for KRK2 and Step 4 for other units.

   Step 4 means an increase of Channel 13 capacity and a decrease of inductance.

   Step 5 means a decrease of Channel 13 capacity and an increase of inductance.

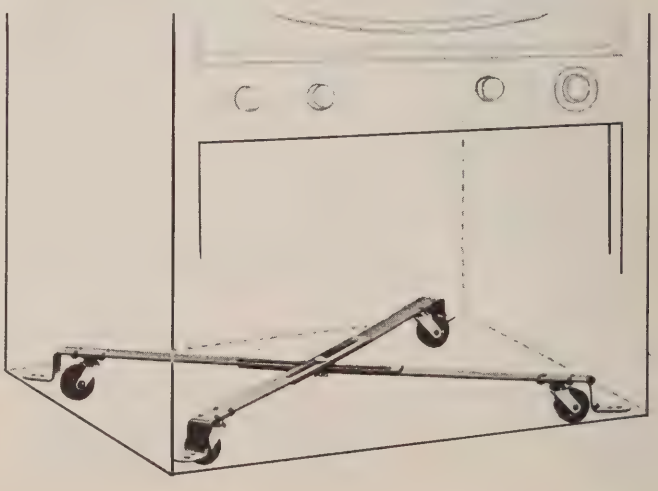
* * *

NEW PRODUCT

The Walter L. Schott Company is introducing its new Walsco TV Rolabout, a roller-coaster idea that fits almost any television console. Regardless of size, the TV Rolabout can be adjusted and installed in a matter of minutes.

With 4 ball bearing casters mounted on a heavy steel cross brace which is attached to the base of the cabinet, the TV Rolabout allows for simple movement of even the largest television console. The television set can be turned in any direction with very little effort. The housewife finds this to be convenient for cleaning under and behind the set. Servicing the chassis is likewise made easier for the repair man.

According to Jack Carter, Walsco sales manager, "The TV Rolabout will fit about 95% of the television models now on the market."



The PHOTOFACT Servicer

Vol. 20, Nos. 193 & 194 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ January 15, 1953

NEW PARTICIPANTS

We are pleased to announce two new participants in Howard W. Sams Photofact Folders. Their products will appear in the replacement parts list beginning with Set 194. They are:

Radio Corporation of America, Camden, New Jersey. RCA replacement type numbers will be shown on transformers and sweep circuit components.

Sarkes Tarzian, Inc., Bloomington, Indiana. Sarkes Tarzian replacement selenium rectifiers will be listed.

SERVICING IN THE FIELD

This is the introduction of another aid to servicemen, to be included as part of Photofact television folders starting in Set 194.

Be sure to check this new addition for handy reference on the following:

1. Tuner Oscillator Adjustments: Tells you if you can make touch-up adjustment of the oscillator by removal of the Channel Selector and Fine Tuning Knobs, or if it is necessary to remove chassis from cabinet. Complete oscillator alignment will be given in the regular alignment section.

2. Picture Tube Safety Glass Cleaning: Gives specific instructions if safety glass can be removed for cleaning or if it is necessary to remove chassis.

3. Picture Tube Removal: Instructions for removal of picture tube.

4. Service Adjustment Locations: Line drawing of chassis apron, showing service adjustment locations.

5. Special Adjustments: Instructions for special adjustments which can be made in the field. This includes AGC Field adjustment and other special adjustments incorporated in the set.

6. Horizontal Oscillator Field Adjustment: Adjustment of horizontal oscillator if it can be done without removal of chassis and special test equipment. Bench adjustment will be given as usual in another section.

7. Sound IF Detector Buzz Adjustment: Quick reference to location of detector secondary adjustment.

8. Fuses: Attention called to fuses used, if any, and circuits they protect.

9. Centering: Centering adjustment location.

10. Built-in Antenna Tuning: Reference to tuning location, if used.

11. Disassembly Instructions: Complete instructions for removal of chassis from cabinet.

The following service hints covering Admiral television receivers are brought to you through the courtesy of Admiral Corp., Chicago, Illinois.

Increasing Sensitivity Weak Signal Areas

In some tuners, the decoupling capacitor (C8 in Photofact Set 180, Folder 2, C73 in Photofact Set 177, Folder 2) was 120 mmf. If this capacitor is replaced with a 1000 mmf., the overall receiver gain may be increased 10 to 15%. If the receiver is being repaired for a fringe area, the capacitor should be changed to 1000 mmf. even though the difference in gain is small.

Plate Resistor Burning Out In Cascode Tuners

Chassis 22A2, 22A2A, 22M1, 22Y1,
Photofact Set 180, Folder 2
Chassis 21W1, 21Y1, 21Z1, 21Z1A
Photofact Set 177, Folder 2

Burned out plate resistor (R14 in Photofact Set 180, Folder 2, R13 in Photofact Set 177, Folder 2) is usually caused by excessive plate current in some RF amplifier tubes. This applies mostly to type 6BK7 tubes. If it is necessary to replace this resistor use a 1 watt resistor, Admiral Part No. 60B14-102. In some instances the failure may be caused by shorted decoupling capacitor (C8 or C73). This capacitor may be shorting to the cover plate of the tuner. This should be carefully checked before reassembling the tuner.

Increasing Sound in Fringe Areas

Chassis 22A2, 22A2A, 22Y1
Photofact Set 180, Folder 2

In some fringe areas an increase in sound level can be obtained by detuning the 19.75 MC adjacent video channel trap, A8. When adjusting the fine tuning control on the receiver for best picture in fringe areas, the video IF carrier moves to a higher position on the IF curve and the sound carrier to a lower position. This places the sound carrier very near the frequency of L8 and causes attenuation of the sound level. Therefore, by detuning the trap (L8) the sound level can be increased. Turn A8 in about 7 or 8 turns or until no further increase in sound is apparent.

Improving Vertical Interlace

Chassis 22A2, 22A2A, 22M1, 22Y1
Photofact Set 180, Folder 2
Chassis 21W1, 21Y1, 21Z1, 21Z1A
Photofact Set 177, Folder 2

Wide spacing or pairing of raster lines is an indication of improper vertical interlacing. In some instances pairing of the raster lines may be caused by incorrect setting of the vertical hold control. Inserting a .05 mfd. capacitor across resistor (R72 in Photofact Set 180, Folder 2, R69 in Photofact Set 177, Folder 2) in the vertical output stage will improve vertical interlacing and add to the stability of the circuit.

In addition to this change, a 330 mmf. capacitor inserted from pin 1 of the vertical oscillator tube to ground should be tried. This will also improve interlacing by improving synchronization of the vertical oscillator.

Bending of Picture

Picture bending with changes of contrast control setting is usually a result of improper sync separation due to variations in picture transmission. This variation can be compensated for by lowering the sync separator plate voltage. Reduce the value of the sync separator plate load to as low as 10,000 ohms, depending on severity of bend.

Increasing Width

In some instances, particularly where the line voltage is incorrect, it may be necessary to increase or decrease the picture width. Changing the size of (C74 in Photofact Set 180, Folder 2, C71 in Photofact Set 177, Folder 2) .1 mfd. to .05 mfd. will increase the width. Increasing the value to .5 mfd. will decrease the width.

Improving Sync In Fringe Areas -- 21B1 through 21Z1A Chassis Above Run 15 and 22 Series Chassis

The following changes have been used on field expedients in very distant noisy fringe areas to improve picture synchronization.

CAUTION -- These changes are intended for use in extreme fringe areas and will result in unsatisfactory operation if used in a strong signal area.

(a) Increasing the sync separator voltage in these extreme areas generally improves both vertical and horizontal sync. Change the value of the resistor from the plate of the sync separator to ground (18K). This may be increased up to four times its original value.

(b) Complaints of vertical jump in fringe areas can often be remedied by increasing the size of the resistor (1000 ohms) in the cathode of the Sync Phase Inverter to as high as 4700 ohms. In other cases changing the capacitor, 150 mmf., (C48 in Photofact Set 177, Folder 2, C52 in Photofact Set 180, Folder 2) to 470 mmf. will be more satisfactory.

(c) Changing resistor (R78 in Photofact Set 180, Folder 2, R43 in Photofact Set 177, Folder 2) from 270K or 220K to 470K and adding an additional .5 capacitor in the AGC line (across C33 in Photofact Set 180, Folder 2, C22 in Photofact Set 177, Folder 2) will generally increase contrast and improve picture stability.

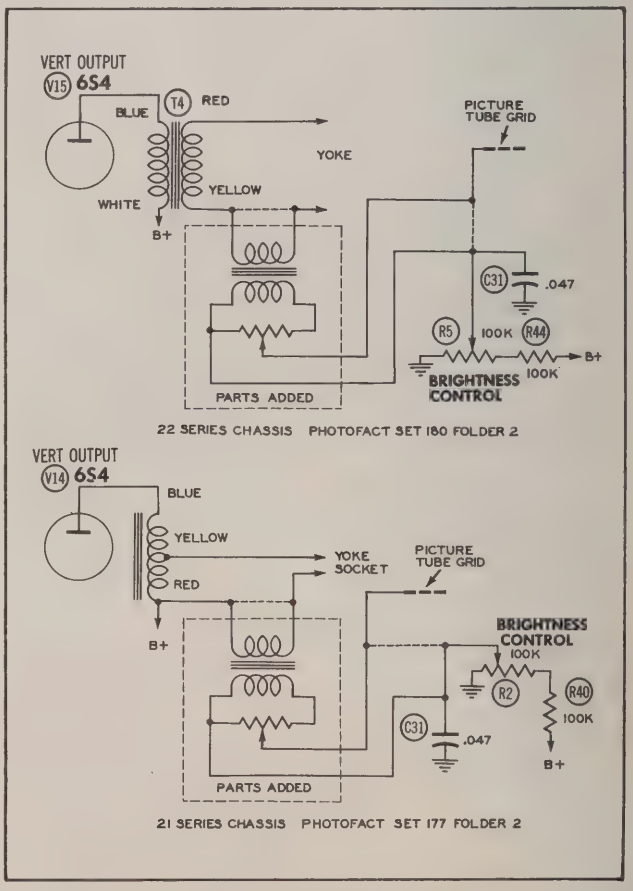
Retrace Line Elimination

Retrace line elimination by means of fixed values has often proved unsatisfactory mainly due to tolerances used in manufacturing and aging of tubes. The following method provides an adjustable control so that a pulse of correct amplitude may be applied to the picture tube.

(a) Connect a 100,000 ohm potentiometer (Admiral Part No. 75B13-12) across the primary winding of a speaker transformer (Admiral Part No. 79C33-1).

(b) Connect the voice coil winding of the speaker transformer in series with the vertical deflection yoke as shown in Figure 1.

(c) Cut the green lead going to pin 2 of the picture tube. Connect the portion of the lead remaining on pin 2 to the center arm of the potentiometer, and connect the other portion of the green lead to an outer terminal of the potentiometer. Adjust the potentiometer until the retrace lines are second. If the retrace lines do not disappear, or they become brighter, change the green lead from the outside terminal of the potentiometer to the other outer terminal. With the contrast set at minimum and brightness control at maximum the potentiometer should be adjusted to a point where the retrace lines just disappear.



ELIMINATING HORIZONTAL SWEEP INTERFERENCE IN BROADCAST RECEIVERS

Radiation of harmonics of television horizontal sweep circuits will sometimes cause whistles or buzz to be heard on broadcast stations, particularly when the broadcast stations are weak. If the input signals to the broadcast receiver can be increased by connecting a long wire antenna (at least 20 feet of wire) to the antenna terminal, the whistles may disappear.

If the interference is not eliminated with a longer antenna on the radio set, the following changes should be made to the television receiver. The changes should be made in the order given below since it may not be necessary to incorporate them all unless the broadcast signals are very weak.

Admiral has developed parts kit 98A71-1 and 98A71-2 to be used in eliminating horizontal sweep radiation interference caused by some Admiral television receivers.

Kit 98A71-1 is to be used in receivers with glass picture tubes and kit 98A71-2 is to be used in receivers with metal picture tubes.

These kits contain all of the parts mentioned in the following instructions.

Glass Picture Tubes: Use Kit 98A71-1

1. Connect a .01 or .015 mfd. 600 volt capacitor (Admiral part no. 64B5-10 or 65A15-1) from each side of the 110 volt AC line to chassis ground.

2. Connect a 500 mmfd. 20KV capacitor (Admiral part no. 65B18-5) between the second anode lead of the CR tube and chassis. This capacitor should be mounted to the inside of the high voltage shield, adjacent to the hole for the second anode lead. The capacitor should be located equi-distant from the HV rectifier tube, the top and the side of the hi-voltage can to avoid flash over to the can or HV rectifier tube. The second anode lead should not be cut; enough of the insulation should be removed to allow the lead to be soldered to the capacitor, making sure that there are no sharp points on the soldered connection to cause corona.

3. Completely cover the bell of the tube with paper back aluminum foil with the aluminum side touching the glass. The foil may be held in position with scotch tape. A hole should be cut in the foil for the second anode connector and the foil near the neck of the picture tube should be folded back on itself so that it makes good connection with the ground spring.

4. Remove the focus coil and deflection yoke from the picture tube. Wind two turns of electrical scotch tape around the exposed portions of the yoke windings, and then wind a 2-3/4 inch strip of aluminum foil tape (Admiral part no. 52A1-17) around the yoke with the aluminum side out. Place the yoke back on the picture tube. Wrap the yoke leads with aluminum foil tape (Admiral part no. 52A1-17), overlapping each turn so as to completely shield the leads. Replace the focus coil and clamp one end of the yoke lead shield between the focus coil and the yoke bracket to ground the shield.

5. If the horizontal output tube is not enclosed in the high voltage shield, push the plate lead of the horizontal output tube into the high voltage shield until the exposed portion of the lead is as short as possible. The exposed portion should then be covered with metal braid ond one end of braid soldered to the high voltage shield.

6. Replace the picture tube cathode lead with a piece of RG59U coaxial cable (Admiral part no. 95A22-2) and ground the shield to the chassis. The cathode lead goes to pin 11 on the cathode ray tube socket and is generally the yellow wire.

Metal Picture Tubes: Use Kit 98A71-2

1. Make change 1, 4, 5 and 6 listed under the heading of "Glass Picture Tubes".

2. If the metal picture tube is a 17CP4 tube, replace it with a 17BP4 glass picture tube; add a 500 mmfd. condenser and shield the tube as described in paragraphs 2 and 3, under the heading of "Glass Picture Tubes".

If it is not feasible to replace the metal tube with a glass one, radiation from the metal cone can

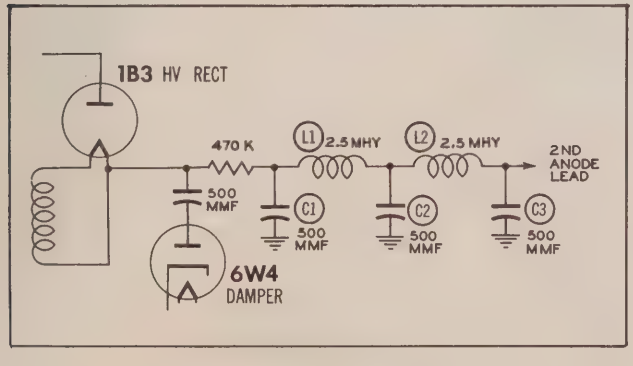


Figure 1

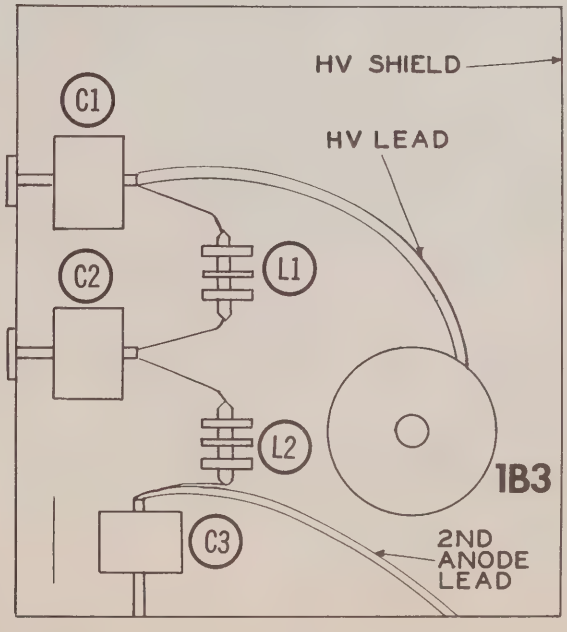


Figure 2

be reduced considerably by connecting additional filtering in the second anode lead as illustrated in typical circuit, Figure 1. See Figure 2 for location of components.

REMARKS:

Locate chokes and capacitors equi-distant from top of can and other parts to avoid possible flashover.

The following hints on picture tube handling are brought to you through the courtesy of Motorola, Inc.

The facts given may be well known, but we believe they are of sufficient importance to bear repeating as a reminder.

1. Larger tubes implode with greater force. (Note: A 27" tube could blow a cabinet apart.)

2. Cylindrical tubes are more subject to implosion than are spherical tubes. This is because the glass thickness varies more. The screen is thicker at the corners than it is in the center. This results in uneven expansion and contraction with heat and cold. (Note: This is the reason you can pour hot water in a thin glass without cracking it; but it will almost always break the glass, if hot water is poured into a tumbler which is thick at the bottom and thin at the top.)

3. Most implosions are caused by improper handling of picture tubes. This can occur in the picture tube factory, the television factory, or in the service shop. (Note: Glass is relatively strong until the "skin tension" is broken. To cut a window glass you mreely "scratch" the surface with a glass cutter, after which the glass breaks cleanly and easily. A bump, such as one tube against another or metal against a glass tube, likewise causes a "skin fracture", which, even though microscopically small, weakens the structure of the glass.

Therefore, we would like to remind you of certain precautions that should always be observed. (We know that you know them, but sometimes we get careless.)

1. Wear goggles when replacing picture tubes and when servicing the top of the chassis.

2. When replacing a picture tube, never let it strike the metal chassis or any metal brackets on the chassis.

3. Never let two picture tubes bump each other.

4. Never set a picture tube face down on a concrete floor. The scratches not only mar the screen, but also weaken the structure of the glass.

5. When servicing the chassis on the bench, never let the picture tube act as a support for the chassis. The proper supporting service brackets should be mounted on the chassis to support it independently of the tube.

6. Be sure the service bench is clean, so that if it becomes necessary to remove the picture tube from the chassis and rest it on the bench, dirt and grit on the bench won't scratch it.

7. Beware of gritty particles under the ion traps. They put ring scratches around the tube neck.

IN OTHER WORDS, TREAT PICTURE TUBES WITH RESPECT. DON'T GET CARELESS WITH THEM.

BOOK REVIEWS

Primer of Electronics and Radiant Energy
2nd Edition
by Don Caverly

McGraw-Hill Book Co., Inc.
New York 10, New York
343 pages - 5.50

The daily life of every person is being affected in some measure by the field of electronics--the findings of years of research are moving from the laboratory into the home, the office, the automobile. Since the first atom bomb exploded, the technical terms describing it have become household words. Here in a text written in non-technical terms which defines and explains the general principles of radiant energy and how they are applied. For the layman interested in learning of the basic phonomena or for the technician who wants to keep up to date on associated fields the book is recommended reading.

Editor's Note: Have you any good customers who want to know all the "whys" while you are servicing their set Here's something constructive to hand them to read and you can work on the set.

Radio Operating Questions and Answers - 11th Edition
by J. L. Horning and Alexander A. McKenzie

McGraw-Hill Book Co., Inc.
New York 10, New York
557 pages - 6.00

This new edition of a popular book presents specific, concise information on radio law, operating practice, and theory for those studying to pass the FCC commercial radio operator exams of various license grades. Covering over 1,900 answers, grouped according to sequency of elements in several general categories, this book should prove valuable to anyone seeking a commercial "ticket". (The source of the questions is the FCC Study Guide includes the newer elements on Aircraft Radiotelegraph and Ship Radar Techniques.)

The PHOTOFACT Servicer

Vol. 20, Nos. 191 & 192 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ January 1, 1953

The following service hints on RCA Victor television receivers are brought to you through the courtesy of Radio Corporation of America, RCA Victor Division.

Models 17T200, 17T201, 17T202, 17T211, 17T220, 21T208, 21T217, 21T218, 21T227, 21T228, 21T229.
Photofact Set 184, Folder 12

ADJUSTMENT OF AGC CONTROL

In setting the AGC control on these RCA receivers, care must be taken that the receiver is generating the maximum AGC voltage which will be required for that particular location of the receiver.

If the AGC control is adjusted on a weak signal, the receiver may overload, bend on sync etc., when a stronger signal is received.

One source of difficulty not likely to be suspected is the position of the fine tuning control. If the AGC control is adjusted with the fine tuning set so that the picture carrier is low on the slope of the i-f response curve, then the receiver may overload, bend on sync, etc., when the picture carrier is moved up the slope with the fine tuning control. The obvious cure is to set fine tuning so that the picture carrier is well up the slope (fine tuning ccw on KRK8) when making final adjustment of the AGC control.

Models 17T150, 17T151, 17T163,
17T172K, 17T133K, 17T174K
Photofact Set 169, Folder 13
Models 17T153, 17T154, 17T155, 17T160, 17T162
Photofact Set 158, Folder 11
Models 21T159, 21T165, 21T176, 21T177
21T178, 21T179
Photofact Set 157, Folder 8

AGC THRESHOLD CONTROL ADJUSTMENT

The AGC control is adjusted at the factory to provide maximum possible gain without clipping sync for all signals above the receiver threshold up to 25000 microvolts. The adjustment of this control should not be touched in the field unless it is definitely known to be incorrect. If the control is misadjusted so as to increase the receiver gain, it may overload when a strong signal is received or when a weak signal temporarily increases in strength due to unusual propagation conditions. On the other hand, if the receiver gain is lowered by the AGC control, the sync noise immunity is reduced.

In order to reduce the prominence of snow on weak signals it is important that the picture control not be operated at its maximum clockwise position. Such an adjustment will provide a higher contrast picture but at the same time may produce an apparent poorer signal to noise ratio due to the fact that an excessive amount of signal on the kinescope grid causes the snow to bloom or defocus thus causing the flake particle to become larger and more prominent than normal. At the same time it is equally important that the receiver be focused to obtain the appearance of the least amount of snow in the picture.

Only under two conditions can it be considered permissible to adjust the AGC control. In an area where the signal is so weak that the snow practically obscures the picture after having taken all the above precautions, then the AGC control may be adjusted to give the best signal to noise ration. It should be recognized however, that trouble from loss of sync noise immunity might be experienced.

The other condition which would justify adjustment of the AGC control is where a signal of over 25,000 microvolts is received. Under this condition the AGC control should be adjusted until the receiver no longer overloads.

NOTES ON GERMANIUM CRYSTAL DETECTOR

Several different types and makes of crystals are used, such as 1N60, 1N64 and CK706. These crystals have a slightly different characteristics and may not be directly interchangeable. In production these differences are taken care of by varying the value of the resistor across the primary of the transformer in the detector assembly.

If the crystal is to be replaced, it should be replaced by one of the same make and type. However, if desired, the entire transformer and matching resistor may be installed. In any event if the transformer or crystal is replaced, the over-all response should be checked.

If a crystal is replaced, care should be taken to get it connected in the proper polarity. Since germanium crystals are marked differently than selenium rectifiers, confusion may result. Selenium rectifiers are marked + and - to show the polarity of the DC output voltage. Germanium crystals are marked to show the polarity of voltage that must be applied to obtain maximum current flow. The cathode end of a germanium crystal may be coded with green paint or marked - . The anode end may not be coded or may be coded + . In schematic symbols, the anode is shown as an arrow (▲) and the cathode as a flat bar. Care should also be taken not to overheat the crystal with the soldering iron as damage to the crystal may result.

As a protection against damage to the crystal detector, a 220 ohm $\frac{1}{2}$ watt resistor has been added in

series with the screen of the 6AG7 video amplifier. This resistor is designated as R67 in Photofact Set 169, Folder 13.

L24 (A1) FREQUENCY CHANGE
Photofact Set 157, Folder 8 and
Photofact Set 158, Folder 11

In late production receivers, the adjacent channel picture trap in L24 (A1) has been tuned to 39.25 mc. rather than 39.75 mc. This results in slightly more sound sensitivity when operating the receiver in fringe areas. It also provides slightly higher adjacent channel picture rejection when the fine tuning is adjusted so as to roll the picture carrier up on the slope of the IF response as is done in receiving weak signals.

FUSE CHANGE

Early production receivers employed a 0.25 ampere fuse. This was later changed to a 0.20 ampere slow blow type. The latest production receivers have reverted to the regular type 9.25 ampere fuse, stock number 73600. If a fuse requires replacement, it is recommended that the regular type be employed.

VERTICAL SYNC AND HOLD IN 17T153 SERIES

In a few cases it has been found that C99 has changed value with time and temperature requiring resetting the vertical hold control during initial warm-up and causing the control to be operated at the extreme clockwise position. If such a condition is encountered, replace C99 with another capacitor which will permit normal operation of the control.

SOCKET CONNECTIONS TO 1B3GT RECTIFIER (KCS66 SERIES)

In some KCS66 series chassis, the 1B3GT socket, terminal 5 has been used as a tie point. It has been found that some brands of tubes have an internal connection in the tube between pins 5 and 7. Such tubes will not operate in KCS66 series chassis which are wired as noted above.

When replacing the 1B3GT tube in the field, the serviceman may employ one of the three following methods to avoid difficulty.

1. Use a tube which does not employ a connection between pins 5 and 7.

2. Rewire the 1B3GT tube socket so that terminal 4 is employed as the tie point instead of terminal 5.

3. If the tube has a connection between pins 5 and 7, clip pin 5 off of the tube base.

DEFLECTION TROUBLE SYMPTOMS IN 21 INCH RECEIVERS

Fold-over or white bar in center of raster. This trouble may be caused by low screen voltage on the 6CD6 tube due to one of the screen resistors being open.

Low brilliance, change in pix size and linearity, etc: This may be caused by a defective L42.

Poor interlace--To prevent coupling between the vertical and horizontal sweep circuits, thus causing poor interlace, dress the red lead from the yoke socket to the HV transformer under the lance on the side of the high voltage cage. To prevent parasitic oscillations in the horizontal sweep circuit, C105 should be connected from pin 2 of V18 to ground instead of from the nearby terminal board to ground.

The following service hints are brought to you through the courtesy of Motorola, Inc. from the Motorola "Service and Installation Bulletin".

CORONA PROBLEM

Larger picture tubes have required increases in high voltage. This increases the corona problem, and bad corona can cause a fire in the high voltage section of the television set.

Therefore, we would like to remind you of certain precautions that should always be taken, when servicing a set.

1. Lead Dress. If it becomes necessary to make repairs or replacements around the high voltage compartment, be sure to check all lead dressing carefully. Any low voltage lead or any lead near ground potential dressed too close to a high voltage point can cause corona spray, or even an arc to be drawn from the high voltage point; this can eventually start insulation burning.

2. Solder Points. Any soldering which is done on any part of the high voltage circuit must be done with great care. No sharp points of solder should be left protruding, but the joint should be smoothly rounded off. In addition, if the area was previously covered with high voltage insulating cement or wax, this coating should be restored upon completion of repairs.

3. In attaching wires to socket terminals, transformer terminals, etc., again make sure that the wire is not left sticking up in a sharp point, but is buried completely in the solder, which seals the connection.

4. In general, no attempt should be made to repair high voltage transformers by splicing breaks in windings, etc., because this cannot be successfully done in the field without serious hazard of arcing and corona later on. It is far better to replace a defective transformer with a new one.

5. When repairs are completed, a careful inspection of the high voltage compartment and leads in a darkened room, with the set in operation, is well worthwhile because corona, which might not be visible in bright light, will show up in a darkened room. The smell of ozone should always be investigated and a set which gives off this characteristic indication of corona should not be released until the source of corona has been found and eliminated.

Needless to say, the same thing is true when a set gives an audible indication of intermittent arcing, which is not sustained enough to cause either the ozone smell or burning of insulation. The source should be found and eliminated because the condition may get worse and cause a fire when the set is reinstalled in the customer's home.

The PHOTOFACT Servicer

Vol. 19, Nos. 189 & 190 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ December 15, 1952

CORRECTION NOTICE

Conrac Models 61, 64.

Photofact Set 185, Folder 5

The picture tube for Model 61 series should be 21AP4A. All references to 21EP4, 21FP4 should be deleted and 21AP4A substituted.

FIELD EXPERIENCES

For every "Field Experience" published, we issue a certificate good for one PHOTOFACT Folder Set. Awards are issued at the time of publication. Since it is impossible to verify the accuracy of contributions, we cannot be responsible for either the diagnosis made of the receiver trouble, or the results which will be obtained by following the suggested repair routine. All contributions become the property of Howard W. Sams & Co., Inc.

MOTOROLA Model 12T3 (Ch. TS-53)
Photofact Set 115, Folder 7

Complaint: After set has been operating for twenty or thirty minutes the bottom of the picture creeps up and leaves about one inch gap between mask and bottom of picture. Top of picture fills mask okay. The entire picture does not move. Height control has no effect.

Cause and Repair: Open vertical discharge capacitor, Item C81. Replace capacitor.

Raymond W. Rineay
1031 Clovet Street
New Orleans 17., La.

* * *

SENTINEL Model IU424, Series YA
Photofact Set 124, Folder 9

Complaint: No roster.

Analysis and Repair: No high voltage. Low grid voltage on 6BQ6. The 6BQ6 drawing heavy current, as noted by plates turning red. The horizontal feedback capacitor, Item C65, was shorted. Replace capacitor.

Warren Waters
604 Main Street
Covington, Kentucky

* * *

WESTINGHOUSE Models Using Ringing Coil in Horizontal Oscillator Circuit

No raster due to inoperative horizontal oscillator, as noted be lack of drive on grid of horizontal output tube. Check plate voltage of horizontal oscillator. If voltage is low or nil, check .1 mfd. capacitor from ringing coil to chassis. Replace with .1 mfd., 600 volt unit.

T. N. Lunt
Lunt's Radio Electric Shop
4 Pleasant Street
East Rochester, New Hampshire

* * *

EMERSON Model 651D (Ch. 120124, B)
Photofact Set 116, Folder 5

Complaint: Horizontal wiggle after receiver warms up.

Analysis and Repair: Scope showed sync pulses limiting on strong signals after warm up. This was due to increased negative bias on direct coupled first video amplifier. Scope showed video level at video detector increased as receiver warmed up. Check of AGC voltage showed that drop of 12% would cause fault to occur. To isolate faulty stage, battery bias was put on one controlled grid at a time with others connected to AGC bus. First video IF amplifier was found to be at fault. Replacing tube corrected fault.

J. C. Geist
2423 Evans Drive
Silver Springs, Maryland

* * *

TRAV-LER Model 16T
Photofact Set 86, Folder 16
(Also Prod. Chge. Bul. 31, Set 156-3)

Complaint: Lack of picture definition.

Analysis and Repair: Cathode bias resistor (R98) in 6BG6 had charged in value from 82 ohms to 50 ohms. Replaced with 1 watt resistor of proper value.

Earl W. Lambert
750 95th Street
Niagra Falls, New York

* * *

WESTINGHOUSE Model H336T5U
Photofact Set 134, Folder 12

Complaint: Severe distortion and loss of volume.

Analysis: Troubleshooting procedure found positive voltage on grid of output tube (50C5). Voltage read-

ing approximately 35 volts when set first turned on and dropping to 10 volts when set warms up. First tried new 50C5, then checked coupling capacitor in couplate for leakage. Both were okay. Visual inspection showed tube socket discoloration and check revealed leakage between screen grid terminal (Pin 6) and control grid terminal (Pin 5).

Repair: Replaced tube socket.

Donald Anglin
Radio Hospital
Groom, Texas

* * *

ADMIRAL Chassis 20A1
Photofact Set 77, Folder 1
(Also Prod. Chge. Bul. 23, Set 140-1)

Complaint: No picture, no sound, raster normal.

Analysis: Normally this complaint would be due to faulty tubes or components in the front end. In this particular set, after checking front end tubes, the video amplifier tube, 6AC7, was checked and found to be the culprit. This affected the voltage applied to the AGC tube which caused a high negative voltage to be applied to the grids of the RF and 1st and 2nd video amplifiers.

Nicholas D. Barbieu
Tru-Vue Electronics Inc.
649 East 180th Street
Bronx 57, New York

* * *

SUPPLEMENTARY MERIT TV TRANSFORMER REPLACEMENTS

PHOTOFACT FOLDER				APPLICATION			
Set No.	Folder No.	Page No.	Name	Item No.	Part No.	Merit Replacement	Description
68	16	16	Strom.-Carl.	T3	161232	A-3001	Vertical Block. Oscillator
68	16	16	Strom.-Carl.	T4	--	HV0-3	Horizontal Output Transformer
68	16	16	Strom.-Carl.	T6	--	MD-12	Deflection Yoke
68	18	15	Truetone	T4	55C113	HV0-3	Horizontal Output Transformer
68	18	15	Truetone	T6	53B140	MD-12	Deflection Yoke
68	18	15	Truetone	T7	51A1065	MF-1	Focus Coil
69	4	16	Bendix	T6	LC0D00	MD-12	Deflection Yoke
69	4	16	Bendix	T7	LC0F00	MF-1	Focus Coil
69	9	15	G. E.	T1	RTP-066	P-3066	Power Transformer
69	9	15	G. E.	T3	RT0-058	HV0-7	Horizontal Output
69	13	25	Truetone	T2	B-12C-16050	A-3038	Vertical Output
69	13	25	Truetone	T3	B-13M-13590	MD-13	Yoke Deflection
69	13	25	Truetone	T4	B-13M-13589-2	MF-3	Focus Coil
70	7	15	RCA	T5	71416	HV0-3	Horizontal Output
70	7	15	RCA	T7	71420	MD-12	Deflection Yoke
70	7	15	RCA	T8	73233	MF-1	Focus Coil
71	2	17	Admiral	T6	79B7	HV0-3	Horizontal Output
71	2	17	Admiral	T8	94B2-1	MD-12	Deflection Yoke
71	6	16	Ansley	T5	--	HV0-3	Horizontal Output
71	6	16	Ansley	T6	--	MF-1	Focus Coil
71	6	16	Ansley	T8	--	MD-12	Deflection Yoke
71	14	15	Teletone	T4	TTR154	HV0-3	Horizontal Output
71	14	15	Teletone	T6	TTR159-D	MD-12	Deflection Yoke
71	14	15	Teletone	T7	TLF521-D	MF-1	Focus Coil
72	4	15	Airline	T5	53X296	HV0-3	Horizontal Output
72	4	15	Airline	T7	9A1987	MD-12	Deflection Yoke
72	4	15	Airline	T8	9A1974	MF-3	Focus Coil
72	8	18	DuMont	T3	20003931	A-3001	Vertical Block. Oscillator
72	8	18	DuMont	T4	20003951	HV0-5	Horizontal Output
72	8	18	DuMont	T6	21004241	MD-12	Deflection Yoke
72	8	18	DuMont	T7	21004251	MF-2	Focus Coil
72	12	21	Strom.-Carl.	T4	161023	HV0-5	Horizontal Output
72	12	21	Strom.-Carl.	T6	114644	MD-12	Deflection Yoke
73	5	15	Firestone	T4	TTR154	HV0-3	Horizontal Output
73	5	15	Firestone	T6	TTR159-D	MD-12	Deflection Yoke
73	5	15	Firestone	T7	TLF521-D	MF-1	Focus Coil
73	8	17	Motorola	T1	25C484095	P-3067	Power Transformer
73	8	17	Motorola	T4	25C90052	HV0-3	Horizontal Output
73	8	17	Motorola	T6	24K485474	MD-12	Deflection Yoke
74	3	16	Fada	T4	37.104	TV-160	Horizontal Sync
74	3	16	Fada	T5	42.103	HV0-3	Horizontal Output
74	3	16	Fada	T6	37.102	MF-1	Focus Coil
74	3	16	Fada	T8	37.101	MD-12	Deflection Yoke

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CORRECTION NOTICE

Motorola Model 401A, Photofact Set 179, Folder 8 - Speaker (Item SP1) - Quam Part No. should be 52A1.

General Electric Models 17C110, 17C111 Photofact Set 180, Folder 5 - Speaker (Item SP1) - Quam Part No. should be 12A31.

* * *

The following service hints are brought to you through the courtesy of Motorola Inc., "Motorola Service and Installation Bulletin".

RECORD CHANGER TURNTABLE REMOVAL

Record Changer Models RC36A, RC36C,
PHOTOFACT Set No. 147, Folder No. 8 or
Record Changer Manual CM-4,
Models RC37, RC-40, PHOTOFACT Set No. 141,
Folder 8 or Record Changer Manual CM-4

Several precautions should be observed when the turntables of the above model Motorola record changers are removed for inspection or service.

The following suggestions, all involving removal of the turntable, will save the service men and customer much time, energy and expense:

1. RETAINER CLIP

Normally, a retainer clip (Motorola Part No. 42K692053), which fits around the record spindle, holds the turntable in place and prevents its accidental removal. This clip, if missing, should be installed on all changers serviced.

2. BEARING WASHER

A very important washer is located directly beneath the turntable on the spindle; and, because of the lubricant, it might adhere to the turntable when the turntable is removed. It might then fall to the floor without being noticed and become lost. This washer is the top one of the two bearing washers.

If the turntable is replaced without the bearing washer, it will set too low, and any of the following troubles may occur:

a. The turntable speed may be slow or uneven, producing "wows".

b. The wiper will set too low, and the changer may not reject.

c. The drive screw will set too low, causing a click against the drive dog on each revolution; or the drive clutch lever may be moved to the top of the incline on the trip lever, causing the changer to jam and stop.

d. The under side of the turntable may rub on the idler wheel, producing a gridding noise.

e. The rim of the turntable may rub on the restoring lever during a change cycle.

If the service man is not aware that the bearing washer is missing, he may spend much time trying to repair the changer without success.

ALWAYS MAKE SURE THE BEARING AND THE TWO BEARING WASHERS ARE ON THE SPINDLE POST BEFORE REPLACING THE TURNTABLE.

NOTE: If a bearing washer becomes lost, do not substitute one of soft iron. This is a special, hardened steel washer. Order Motorola Part No. 4A691286.

If, upon removal of a washer, a groove worn by the ball bearings is noticed, replace both washers. Early washers were polished chrome on one side and were soft. Replace only with the later, dull-finished type.

3. GROOVE IN RUBBER WIPER

The wearing of a groove in the rubber wiper under the turntable may be caused by lack of, or improper, lubrication. The correct lubricant to use is Dow-Corning Corp. #DC-33 Silicone Lubricant (Motorola Part No. 11M488020). DO NOT use a petroleum-type lubricant--it will soften the rubber.

TV Chassis TS-216, Photofact Set 158, Folder 8
TV Chassis TS-275, Photofact Set 174, Folder 9
TV Chassis TS-325, TS-326,
Photofact Set 171, Folder 8
TV Chassis TS-351, Photofact Set 173, Folder 9

BUZZ IN INTER-CARRIER MODELS

Audio buzz, when it occurs in inter-carrier models, can generally be divided into two categories:

1. So-called sync buzz, which is caused by interruption of the audio IF at sync pulse rate.

2. Actual vertical scanning frequency pickup by some part of the audio circuit.

To determine which type is the offender, disable the vertical oscillator with the buzz present in

the speaker. If the buzz disappears with stoppage of the vertical oscillator, coupling of the vertical scanning frequency into the audio circuits is taking place. Some examples of this condition on Motorola chassis are as follows:

1. In the early versions of the TS-216, some coupling of vertical scanning frequency into the grid of the first audio amplifier took place from the blue plate lead of the vertical output transformer. In extreme cases, it has been found the best remedy is to unsolder the blue vertical output transformer plate lead from pin 1 of the 12BH7 vertical output tube. Pull this lead back up to the top of the chassis. Run it on top of the chassis to one of the ground kickout holes near the vertical output tube socket and dress it through this hole down to the socket. Resolder to pin 1. Be careful to keep the lead away from the audio tubes.

2. On some of the early TS-216 and TS-275 chassis, the lead connecting the volume control to the grid of the first audio amplifier was routed too close to the vertical saw-forming network, consisting of the charge capacitor C60 in the TS-216, and C61 in the TS-275, and the accompanying peaking resistors. This network is mounted on a terminal strip adjacent to the 4.5 mc trap. The 60 cycle saw voltage was picked up by the lead and applied to the audio grid. The remedy is to dress this lead as far as possible away from the saw-forming network.

3. In the TS-325, TS-326, TS-351 series of chassis, pickup of the vertical scanning frequency, by the grid of the first audio tube V9, can occur if the lead connected from pins 6 and 2 of the 12BH7 vertical tube to the charge capacitor C63 (Ch. TS-35) or C64 (Ch. TS-325, TS-326) is dressed too close to pin 1 (grid) of V9. Redress lead away as far as possible from pin 1 of V9.

4. On the TS-325, TS-351 series of chassis, the lead connecting the arm of the vertical hold control to the blue blocking oscillator transformer lead can be carelessly dressed where it passes the audio tubes, so that one or the other of these tube grids can have the vertical scanning frequency impressed on it. The remedy is to re-dress this lead away from the audio grids.

The foregoing are some of the more obvious possibilities of vertical scanning frequency pickup by the audio system. If these examples are kept in mind, quite often a visual inspection will determine at what point or points such pickup is possible. Then a careful dressing of leads and components in the suspected area will run down and eliminate the trouble.

Another cause of buzz in the audio, which will not be eliminated when the vertical oscillator is disabled, can be due to an overload condition which leads to limiting in the video IF strip or, more often, in the video amplifier. The maximum amplitude of the composite signal is represented by the sync pulse level. If this level of signal causes a tube in the IF strip to limit, it will mean that the video carrier is interrupted at sync frequency because the tube is periodically cut off at this rate. If the limiting is taking place in the video amplifier, the 4.5 mc beat frequency, which has become the new audio IF, will be interrupted at sync pulse rate. The latter is by far the more common occurence but, in either case, the buzz heard in the speaker is caused by this interruption at the vertical sync pulse rate of sixty cycles. The interruption, of course, happens also at the horizontal sync pulse rate but, since this is at a rate of 15,750 cycles, it is less likely to be heard. Limiting in the IF amplifier is usually caused by loss or marked reduction of the AGC voltage. As a general rule, a gassy or leaky IF tube, which allows grid current to flow, will be responsible for this. A good check for this condition is to measure for a voltage drop across the 1.5 meg resistor in the AGC line. If a voltage drop exists, suspect one of the controlled tubes of leakage. Another possibility is a bad germanium crystal. A defective crystal will usually also be accompanied by some degree of sync pulse compression, which leads also to poor sync stability. It will be noted that the operating point of the video amplifier tube in the TS-325, TS-326, TS-351, etc., series of chassis has been shifted slightly by returning the grid resistor to a positive 5-volt source, the cathode of the first audio amplifier. In a normal too strong signal area, the probability of limiting in the video amplifier is greatly reduced by this means because the negative signal applied to the video amplifier grid must first balance out this positive voltage and the likelihood of strong signals being able to drive the tube to cut off is greatly reduced. It is possible that a poor picture tube can be responsible for sync buzz because the operator would have tendency to set the contrast level too high to compensate for the poor tube. If he sets it at such a level that the video amplifier is operating just on the threshold of limiting, it is quite likely that a change in camera or in modulation at the transmitter will result in sync buzz. Another possibility is incorrect operation of the area selector switch, especially in the case of the early versions of this circuit. In the later or "B" versions of the TS-325, TS-326, and TS-351 area selector switch circuit, the grid resistor of the video amplifier is returned to ground only in the fringe position. In the early version, this grid resistor was returned to ground also in the suburban position. The tendency on the part of customers located 30 or 40 miles from a transmitter is to operate the receiver with the area selector switch in the suburban position. Unfortunately, at this distance signal level is quite often high enough to cause the video amplifier to limit with attendant sync buzz. The remedy for this condition in the earlier sets is to rewire the video amplifier grid resistor return, in the suburban position of the switch, to the cathode of the first audio amplifier. This will permit operation of the switch in the surburban position without incurring sync buzz.

Still another possibility of sync buzz is misalignment of the video IF or of the sound IF. Sometimes a relatively small readjustment of the sound take-off coil, or of the ratio detector transformer primary or secondary tuning slugs may cure a buzz problem. Just as the vertical scanning frequency can be picked up by the audio tubes or circuits, it is also possible that the sync pulses themselves may be picked up in the same manner. An example of this is the first audio tube picking up the sync pulses from the cathode lead of the picture tube. The remedy is to dress the lead away from the tube, or to shield the tube. A shield has been added to the tube in later production.

Lamination Buzz. A mechanical 60 cycle buzz is sometimes caused by loose laminations in a transformer. This transformer can be the power trans-

former, the filament transformer, the separate filament transformer used on some chassis for the heater supply of the damping diode, or the vertical output transformer. If caused only by loose laminations, the remedy is to tighten the nuts on the clamping bolts. Sometimes the entire winding is loose on the core and this can be remedied by the careful insertion of wooden wedges between the winding and the core.

NEW PRODUCTS

Merit Coil and Transformer Corporation

Six new power transformers are now being shipped by Merit Coil and Transformer Corp. Type P3076, P3077 and P3078 are of the low voltage, high current design for television receivers. P3079 is an isolation power transformer for use with TV sets using Selenium rectifiers. P3097 is a damper isolation filament transformer. TV auto transformer P3098 is a picture tube voltage booster.

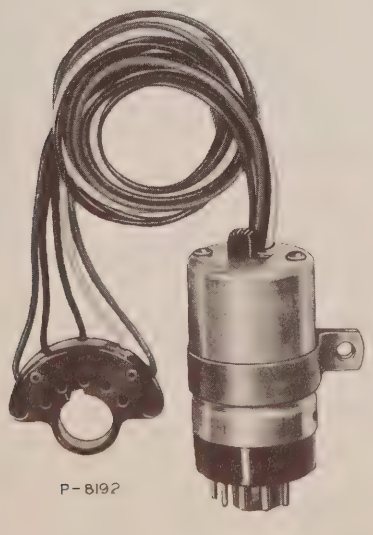
Merit also announced six new IF-RF coils. Three 4.5 mc for TV sound amplifier, sound discriminator and sound detector use. Two 262KC and one 455KC are filter type IF coils for late model auto radios.

Hi-Q Division, Aerovox Corporation

The Hi-Q Division of Aerovox Corp. is now offering forty numbers, instead of the original fifteen, in the ceramic disk capacitors. Expanded listings range from .00001 to .01 mfd. for single-section units; and .0015 and .002 mfd. for three-section units. These expanded listings are included in the 1952-53 Aerovox Catalogue now obtainable from Aerovox distributor, or from Aerovox Corp., New Bedford, Mass.

Standard Transformer Corporation

Standard Transformer Corp. is producing a CR Tube Booster, part P-8192. The tube booster can be used with any electro-magnetic picture tube where dimming is due to low cathode emission. To install, it is only necessary to attach the tube connector to the booster; then attach the connector plug of the booster to the tube. Provided with 18" leads and bracket with screws, it can be mounted on the chassis or cabinet.



FIELD EXPERIENCES

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Crosley Model 10-135
Photofact Set 93, Folder 3

Trouble: Set would play normally for a few minutes, then begin to howl and static.

Cause: Intermittent shorts in 12AV6 (V3), and 50C5 (V4) and loose connection in second IF transformer (L4).

Remedy: Replaced 12AV6 and 50C5. Removed L4 and soldered loose connection inside can.

Charles F. Burket
Box 273
Elkhart, Kansas

* * *

Trav-ler Model 16T
Photofact Set 86, Folder 11
(Also Prod. Chge. Bul. 31, 156-3)

Complaint: No picture, sound okay.

Cause: AFC feedback capacitor, Item C73, shorted.

Remedy: Replace capacitor, also check resistors R88 and R89 for change in value and replace if required.

George Van Durme
5042 Irving Pk. Road
Chicago 41, Illinois

* * *

Ford Model 8072
Photofact Set 44, Folder 4

Complaint: Intermittent reception, volume would go way down but not out completely.

Analysis and repair: RF coupling capacitor, Item 19, caused the trouble. Replaced capacitor.

Ervin L. Sly
6512 E. 6th St.
Sppkane 63, Washington

* * *

Hallicrafters Model 601
Photofact Set 92, Folder 3

Complaint: Horizontal pull through center of picture toward the right. Control had no, or temporary effect. Intermittent loss of vertical sync.

Analysis and repair: Defective coupling capacitor between 1st Sync. Sep. and Sync. Amp. (Item C46). Replace defective capacitor. Check resistors in circuit for change in value.

Joe Tezak
1171 Elm Ave.,
Glendale, California

* * *

Chevrolet Model 986516
Photofact Set 150, Folder 6

Complaint: Dial pointer inoperative.

Remedy: Remove the back cover plate. A sloted guide (visible in Photofact Folder page 2) is located between 6V6(V5) and filter capacitor (C1). The arm riding in this slot was out. Press down and engage in slot at bottom end (closest to chassis).

Donald Dee Waltner
Waltner Electric
Box 93
Moundridge, Kansas

* * *

RCA Victor Model 17T151 (Ch. KCS66C)
Photofact Set 169, Folder 13

Trouble: Washed out picture with outside antenna and no picture with indoor antenna.

Analysis: Plate and screen voltages on V3 and V4 (1st and 2nd Video IF amplifiers) incorrect. No AGC action.

Cause: 100 mmf. capacitor located in L25 (1st Video IF plate coupling) shorted.

Larry Niedziela
Niedziela Radio & Television
1414 Broadway
Buffalo 12, New York

* * *

Silvertone Models 7119, 8097A, 8115, 8117, 8118
Photofact Set 62, Folder 18

Complaint: Dead or very weak.

Analysis and repair: Little or no plate voltage at plate of 7H7. .02 mfd. capacitor located in 1st IF transformer (Item 93) shorted or leaky. Replace capacitor. Check resistor (Item 48).

\- - -

Silvertone Models 1, 2 (Ch. 132.878)
Photofact Set 101, Folder 10

Complaint: No output.

Analysis and repair: Check for broken connection between antenna coil (L1) and tuning capacitor (M1).

Complaint: Loud hum or garbled output.

Analysis and repair: Check for open at connection of RC isolating combination (R11 and C3) to B-.

Editor's Note: Both above experiences were contributed by -

F. J. Kane
Allied Electronics Company
653 West 87th St.,
Seattle 7, Washington

* * *

Ford Model 1BF
Photofact Set 132, Folder 7

Complaint: Set dead.

Analysis: Low plate voltage on plate of 6SK7 (V1). This was caused by shorted capacitor in 2nd IF transformer (L6). The loss of AVC caused the 6SK7 plate current to increase. The set was dead due to shorting out of the audio.

Remedy: Replace 2nd IF transformer (L6).

Charles R. Lewis
Towanda Radio Supply
1 Court Street
Towanda, Pennsylvania

* * *

Emerson Model 702B (Ch. 120136-B)
Photofact Set 159, Folder 5

Complaint: Audio howl and michrophonics.

Cause: The audio howl was due to the location of the couplate C3A through C3C, next to the audio output transformer (T1). The 50L6 caused the michrophonics. It is placed near the speaker.

Remedy: Shifting the position of the couplate (C3) eliminated the audio howl. The michrophonic condition was cured by a small piece of asbestos sheeting placed between the glass envelope of the 50L6 and the front of the speaker.

Editor's Note: A new 50L6 should also have eliminated the michrophonics.

Albert Kramer
Kramer's Radio Service
36 Columbus Avenue
New York 23, New York

* * *

Bendix Model 6100
Photofact Set 111, Folder 3
(Also Prod. Chge. Bul. 16, Set 126, Folder 1)

Complaint: Cannot synchronize picture vertically.

Cause: Vertical peaking resistor (R54) charged in value from 33,000 ohms to 90,000 ohms.

Remedy: Replace resistor with proper value.

John S. Knetzetic
Royal Radio & TV
74 Barthel Street
Buffalo 11, New York

* * *

The PHOTOFACT Servicer

Vol. 19, Nos. 185 & 186 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ November 1, 1952

DIAL CABLE DIAGRAM FOR DUMONT MODEL RA-112A AND RA-113

PHOTOFACT SET NO. 119, FOLDER NO. 5

(Used in RA-112A below serial No. 126293 and RA-113A below serial No. 135323.)

1. Remove three pilot lights, with their clips.

2. Remove dial pointer by pulling outward.

3. Twist four tabs holding dial to mounting plate, and remove dial.

4. Remove defective dial cable, taking care to retain cable tension spring (B). If spring is missing, it may be obtained by ordering part No. 30014461.

5. Rotate tuning shaft fully counter-clockwise. This will place the cam assembly (D) in the position shown.

6. Place pointer pulley (E) in position shown.

7. Fasten cable tension spring (B) to loop at end of dial cable.

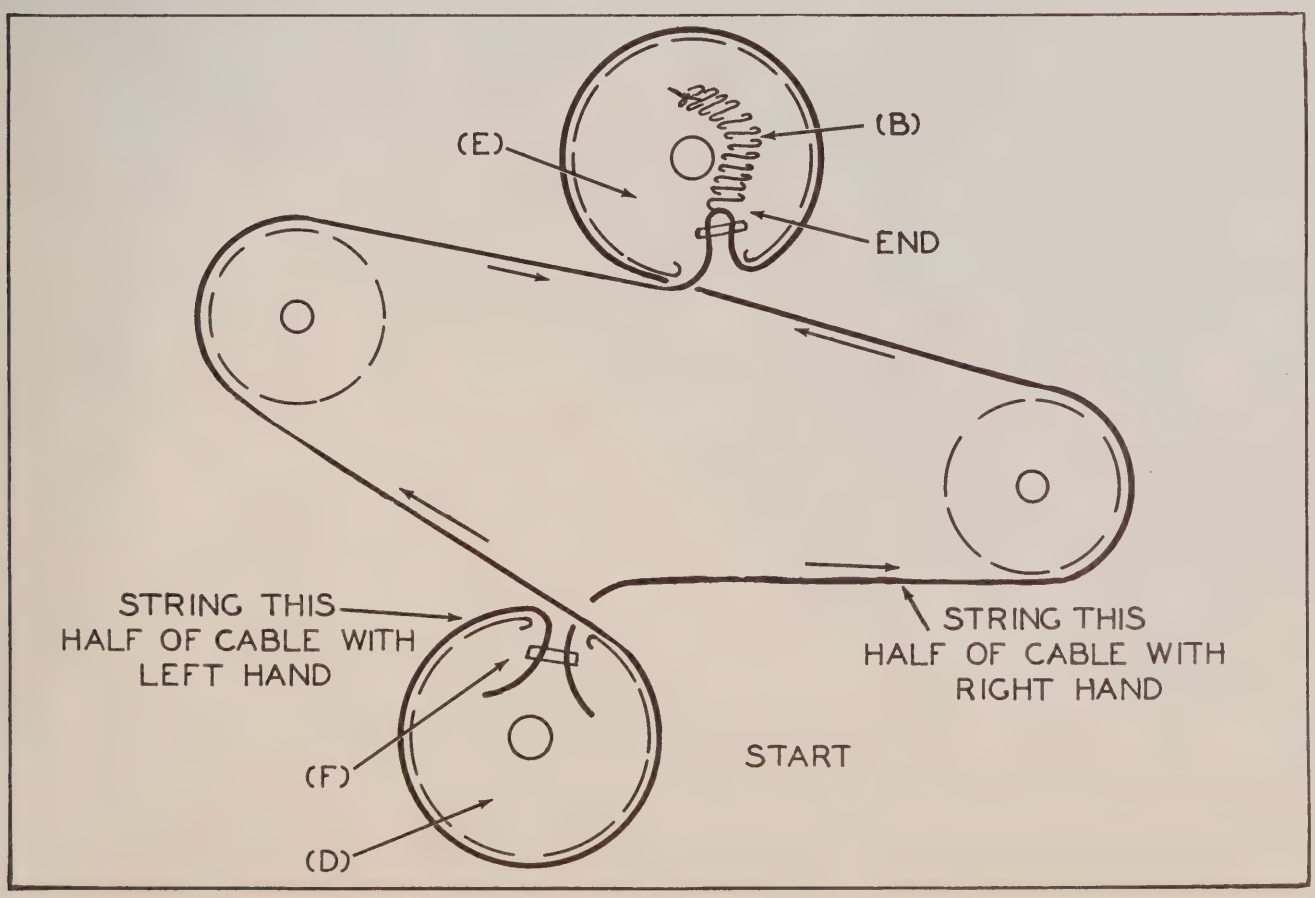
8. String dial cable as shown, starting by placing cable guard (F) in position. Use both hands and string two halves of cable as illustrated. Make sure that cam follower is not disengaged from cam.

NOTE: If insufficient tension in cable, run cable tension spring (B) around pointer pulley (E) hub in direction opposite to that shown.

9. Replace dial, fastening by slight twisting of four tabs (A).

10. Replace three pilot lights.

11. Place receiver in operation, turn in a known high channel station, and place dial pointer in correct position. Pointer should then fall in proper calibration for lower channels. If necessary, minor adjustment of pointer position may be made to correct calibration. Take care that pointer does not rub against dial at any point.



(Used in RA-112A above serial No. 126293 and RA-113 above serial No. 135323.)

1. Remove three pilot lights with their clips.

2. Remove dial pointer by pulling outward.

3. Twist four tabs holding dial to mounting plate and remove dial.

4. Remove defective dial cable. (It consists of two identical cables, referred to as No. 1 and No. 2.)

5. Rotate the tuning shaft fully counter-clockwise (extreme high frequency position) and place pointer pulley in position shown in dial stringing sketch.

6. Be sure that idler tension spring is in place. If it is missing, it may be obtained by ordering part No. 30015901.

7. Wedge knotted end of dial cable No. 1 so that it is held in place by post on gear behind spiral pulley.

8. String dial cable No. 1 in direction of arrows shown on dial stringing sketch. Dial cable No. 1 must ride in idler pulleys and must be strung on inside of groove of pointer pulley towards dial plate, making one complete turn around pointer pulley. Make sure that idler pulleys are free to turn and move in and out.

9. Insert loop end of dial cable No. 1 over lance.

10. Hold pointer pulley in position shown.

11. Insert knotted end of dial cable No. 2 in hole at center of spiral pulley and string in counter-clockwise grooves approximately four turns as shown.

12. String dial cable No. 2 in direction of arrows around pointer pulley, approximately one-half turn, as shown. Dial cable No. 2 must be strung on outside of groove of pointer pulley away from dial plate.

13. Insert loop end of dial cable No. 2 over lance. Center dial cable No. 2 over extrusion on pointer pulley.

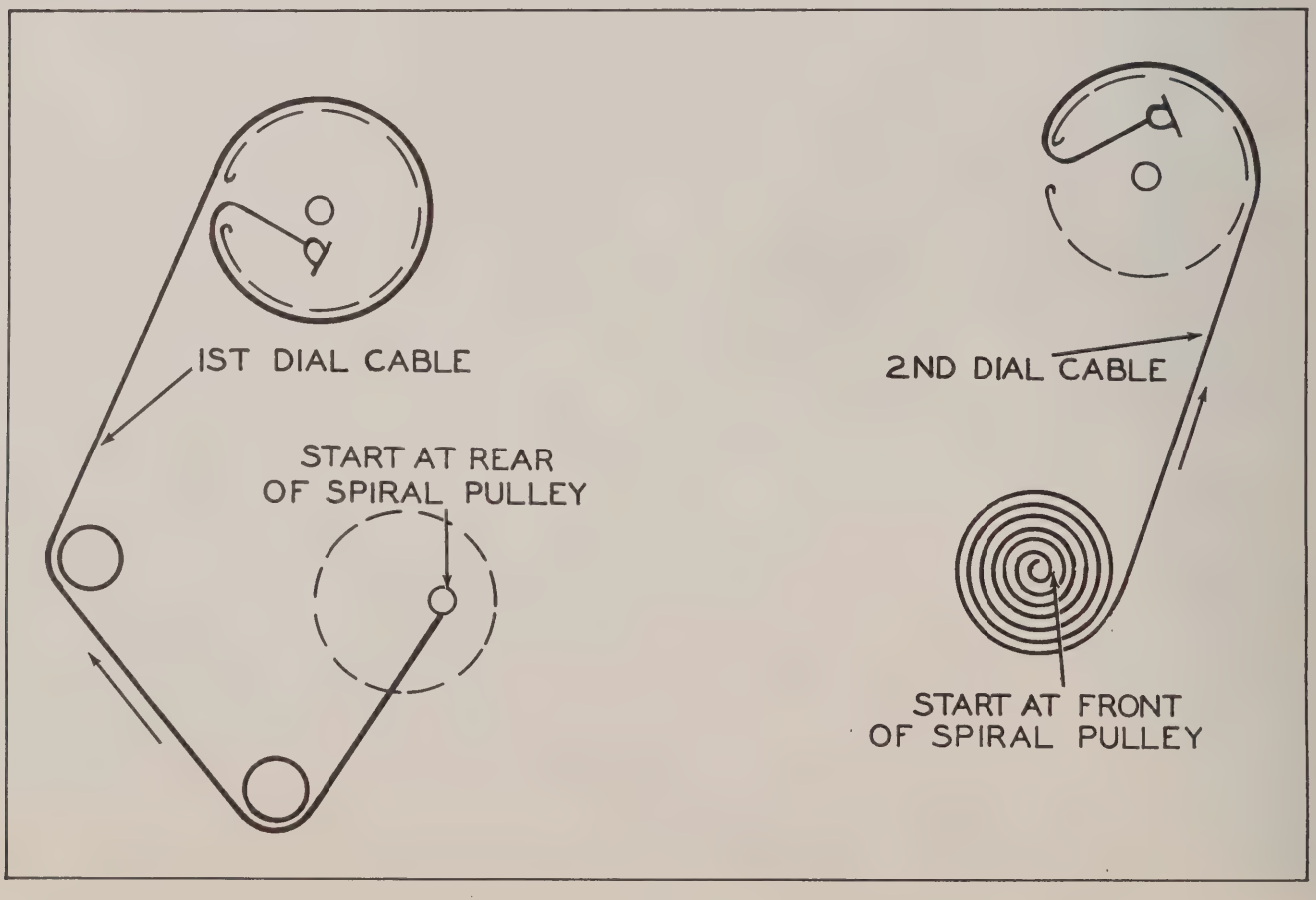
14. Cement knotted end of dial cable No. 2 in place at center of spiral pulley.

15. Replace dial, fastening by slight twist of four tabs.

16. Replace three pilot lights.

17. With tuning shaft fully counter-clockwise, replace dial pointer so that it falls just inside of high frequency side of channel 13 box by the width of the pointer.

18. Place receiver in operation. Pointer should fall in proper calibration on all channels. Minor adjustment of pointer position may be made to correct calibration, if necessary. Take care that pointer does not rub against dial at any point.



The PHOTOFACT Servicer

Vol. 19, Nos. 181 & 182 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ September 15, 1952

CORRECTION NOTICE

Emerson Models 669B, 675B, 688B, 689B, 690B, 692B, 693B, 694B, 697B.

Photofact Set 126, Folder 5

Parts List, Page 14, Item T2-Horizontal Output Transformer - Merit replacement should be HVO-8. Item T4-Yoke-Merit replacement should be MDF-30.

Our thanks to H. H. Stevens of Lakeland Radio Supply, Angola, Indiana, for calling this matter to our attention.

* * *

Wire-Wound Controls Feature Field-Attached Shafts -

The availability of wire-wound controls with field-attached shafts is announced by Clarostat Mfg. Co., Inc., Dover, New Hampshire, manufacturers of resistance devices. The new controls may be used with any one of the eleven different Clarostat Pick-A-Shafts.

The Pick-A-Shaft wire-wound controls come in three series. Series A43 is the Clarostat Series 43 wire-wound control rated at 2 watts. Series A58 is the Clarostat Series 58 wire-wound control rated at 3 watts. Series A10 is the Clarostat Series 10 wire-wound control rated at 4 watts. A wide range of resistance values is available in each series.

A choice of any one of the eleven Clarostat Pick-A-Shafts is made with the purchase of the control. The shaft is inserted in the shaft fitting of the control, and a slight tap seats the shaft under a locking C-washer.

* * *

New Edition of the Cornell-Dubilier
TV Capacitor Replacement Guide, TVR-7A

The new TV Guide lists 1149 TV set models of 73 manufacturers, as compared with 1015 TV set models of 68 manufacturers listed in the original C-D Guide published a year ago.

Section 1 lists TV receiver models alphabetically by make with serial and chassis numbers, original capacitor ratings, C-D recommended replacement with new C-D rotational stock number.

Section 2 lists next to each C-D capacitor the TV set models for which it can be used. This shows the service man the popularity of that electrolytic, and indicates the relative quantity he should keep in stock for maximum turnover on a minimum inventory.

Section 3 lists rated capacity and voltage of each C-D twist-prong electrolytic, physical specifications, rotational stock numbers, dealer's net cost and list price.

Section 4 is devoted to a cross-index of former twist prong electrolytics and their present equivalent part numbers.

The new C-D Guide TVR-7A is available to service men free of charge, only through local C-D distributors.

* * *

BOOK REVIEWS

Gernsback Library Books
Radcraft Publications, Inc.,
25 West Broadway, New York 7, N. Y.

Recently introduced titles in this excellent series are:

Basic Radio Course
by John T. Frye
175 pages - $2.25

The author, well-known in the service profession for his factual writings, has treated a complex subject in a simple and straightforward manner. The first chapters deal with basic theory and components. This knowledge is then applied to circuits and servicing techniques.

* * *

Radio Tube Fundamentals
by George J. Christ
96 pages - $1.00

This book explains to the practical service technician some of the facts behind the ratings and characteristics of the many tubes he encounters. The first chapter defines tube terms and outlines some of the basic theory. Subsequent chapters are devoted to the major receiving tube classifications and to a study of their use.

* * *

Model Control by Radio
by Edward L. Stafford, Jr.
112 pages - $1.00

This is an extremely interesting discussion of the various control systems, their theory, design, and application. While intended for the hobbyist, any radio technician would find the information interesting and might be surprised to learn of the many practical systems.

Television Technotes
by Martin Clifford
128 pages - $1.50

A collection of service hints and production changes on many of the popular receivers, this book gives the service technician a guide or reference to various service problems. The book is practical and should be useful if the chassis involved exhibits the symptoms outlined.

* * *

The following service hints covering Motorola TV receivers are brought to you through the courtesy of Motorola Inc. "Motorola Service and Installation Bulletin."

TV Ch. TS-325, TS-326 Series
Photofact Set 171, Folder 8

Excessive 25BQ6 failure in some TS-326 Series TV chassis.

Due to heater-to-cathode flashovers in some 12AX4 tubes, some TS-325 and TS-326 chassis require frequent replacement of the 25BQ6 horizontal output tube due to open heater. This was traced to a heater-to-cathode arc caused by the high voltage pulse on the 12AX4 cathode flashing over to the heater and may be remedied by installing a disc type 5000 mmf. ceramic capacitor, Motorola Part No. 21R115312 from pin 7 of the 12AX4 damping diode (V15) to ground. Use the chassis ground kick-out immediately adjacent to pin 7. The capacitor serves to bypass the pulse and prevents the breakdown. This capacitor has been added in production.

For a more balanced heater current distribution, in case of heater failure in one or the other of the parallel heater strings, later production sets have the 25BQ6 and 25L6 heaters, interchanged in the heater circuit. This serves to protect filter capacitor C3A in case of 25L6 heater failure.

* * *

TV Ch. TS-325, TS-326 Series
Photofact Set 171, Folder 8
TV Ch. TS-351 Series, Photofact Set 173, Folder 9

Yoke ringing in TS-325, TS-326, & TS-351 Series TV Chassis.

The value of the shunt capacitor, horizontal deflection coil, is rather critical in the later deflection yokes, and ringing can result if it varies too much from optimum. The 27 mmf. capacitor used satisfactorily in the earlier yokes, has been found to be too low for the present distributed capacity yokes. Although 47 mmf. is about right for the present yokes, 50 mmf. and 56 mmf. capacitors have been used. If ringing is encountered, replace the capacitor with one of correct value, as found by experiment. The capacitor must have a 2000 volt rating.

Reducing beat interference in TS-325, TS-326, & TS-351 Series TV Chassis.

It has been found that a beat type of interference, appearing as either a stippled effect or diagonal lines, can be lessened by moving the high side of R36, the detector load resistor, to the junction of L15 & L16.

\- - -

No AGC due to faulty 6CB6 tubes in TS-325, TS-326, & TS-351 Series TV Chassis.

There have been cases of 6CB6 tubes developing a high resistance leakage between grid and filament. This will adversely affect the AGC so that either an overload condition or loss of sensitivity results. It has been found that in the great majority of cases, the defective tubes will show a high resistance leakage between grid and filament when measured cold with a VTVM.

\- - -

Audio beat on Channel 7 in TS-325, TS-326, & TS-351 Series TV Chassis.

If you should encounter an audio beat on channel 7, it can be corrected by the following steps:

1. Replace the shielded contrast lead with an unshielded lead.

2. The shielded volume control lead is originally routed between the nine-terminal terminal strip and the audio IF strip. Re-route this lead to the other side of the terminal strip to minimize the 4.5 mc. pickup in the lead.

3. The ground lead from the center pin of the ratio detector socket (V8, 6AL5) is originally dressed over the 10 mfd. electrolytic (C6) to a chassis ground kick-out. Move the lead from this kick-out to the kick-out near the tube socket on the video IF side.

* * *

TV Ch. TS-67, Photofact Set 111, Folder 9

Overheating of horizontal output transformer in TS-67 TV Chassis.

Cases of the horizontal output transformer overheating in these chassis, have been traced to a resonant condition in the horizontal linearity circuit. This condition is, in turn, due to the improper setting of the core in the horizontal linearity coil. For proper adjustment, proceed as follows:

1. Replace the fuse temporarily with a milliammeter having a 150 ma. scale.

2. Adjust the slug throughout its range. It will show a peak on the meter of 125-130 ma. at both ends of its range.

3. Find the point in between where the meter dips to approximately 90 ma. with good horizontal linearity. This is the proper setting of the core.

Note: If this dip does not occur, it indicates a defective component in the linearity circuit, i.e., C106 (.03 mfd.), C107 (.04 mfd.), or the coil itself (L30).

4. Replace fuse.

The following service hints covering Sentinel TV receivers are brought to you through the courtesy of Sentinel Radio Corporation.

Models 438, 439, 440, 441, 443, 444
Photofact Set 157, Folder 9

Subject: To increase the tone control range so as to obtain greater variations in tone with the tone control.

Modification: Replace the 2200 ohm resistor (R68) between the center and high (plate) side of the tone control with a jumper wire. Replace the .047 mfd. 600 volt condenser (58) located between the low side of the tone control and ground with a .1 mfd. 600 volt condenser.

* * *

Critical Horizontal Hold Control Action -

Reason: Critical horizontal hold control action and/or inability to adjust horizontal hold, have in some cases been traced to a leaky .05 mfd. or .047 mfd. horizontal reference feedback condenser, causing several resistors to change value. These resistors are the ones connected in series with the feedback condenser to ground, and also those in the cathode and plate circuit of the horizontal oscillator. This feedback condenser failure sometimes causes associated condenser failure due to high voltage applied to them.

Remedy: If critical horizontal hold occurs check all the applicable components indicated on the list.

Important: A shorted .05 mfd. or .047 mfd. feedback condenser will result in no high voltage, therefore no raster will appear on the screen.

A simple check to determine if the horizontal reference feedback condenser is shorted is to remove the 6AL5 phase detector while the set is in operation. If the raster appears with the tube removed the feedback condenser is shorted. When replacing a shorted .05 or .047 mfd. feedback condenser always check the other parts which might be affected as indicated on the list. To prevent future failures a 1000 volt replacement should be used.

Below is a list of the models, the schematic reference numbers, and the value of the feedback condenser and the parts which are likely to be affected.

Model Nos.	Feedback Cond.	Parts Affected	Photofact Set - Folder
401, 402, 406 411	C78 .05MFD	R71, R81, R83, R79, C79 27k, 5.6k, 4.7k, 1.5k, .003MFD 5% 5% 400v	70 9
412, 413, 414 415, 421, 422	C64 .05MFD	R77, R83, R78, R82, C65 27k, 5.6k, 4.7k, 1.5k, .003MFD 5% 5% 200v	100 11
416,	C64 .05MFD	R72, R78, R73, R77, C63 27k, 5.6k, 10k, 1.5k, .003 5% 5% 200v	117 12
420B, 423 424, 429, 430 431	C65 .05MFD	R70, R78, R87, R77, C64 27k, 5.6k, 4.7k, 1.5k, .003 5% 5% 200v	124 9
419, 420	C66 .05MFD	R69, R81, R70, R80, C65 27k, 5.6k, 3.3k, 1.5k, .005MFD 5% 5% 600v	115 9
425, 428, 432, 435	C66 .05MFD	R64, R85, R94, R83, C65 27k, 5.6k, 3.3k, 1.5k, .005MFD 5% 5% 600v	127 10
438, 439, 440 441, 443, 444 Series 2XD, XD, XXD	C68 .047MFD	R111, R87, R92, R91, C69 22k, 100k, 6.8k, 820, .0047MFD 5% 5% 600v	157 9

General Electric Clock Parts Replacement Guide

RSM-3, No. 59 was included in Photofact Set 160 as a Bonus Folder. Since publication of the original RSM-3, No. 59 a few changes have been made in the catalog numbers of some of the items listed. These changes are listed below, courtesy General Electric Company.

Page & Clock Nos.	Description	Cat. No. Changed From Tele. No.	to G.E. No.
4 - RZC-001	Alarm set knob - ivory, threaded	4X5	RZK-002
RZC-005	Alarm set knob - ivory, threaded	4X5	RZK-002
RZC-006	Alarm set knob - ivory, threaded	4X5	RZK-002
RZC-010	Alarm set knob - ivory, threaded	4X5	RZK-002
5 - RZC-012	Alarm set knob - ivory, threaded	4X5	RZK-002
RZC-014	Fawn slotted knob - 2 listed	59X774	RZK-005
6 - RZC-009	Ivory slotted knob - 3 listed	59X716	RZK-003
RZC-009	Alarm set knob - ivory, threaded	4X5	RZK-002
RZC-015	Ivory slotted knob - 2 listed	59X716	RZK-003
7 - RZC-001	White slotted knob - 3 listed	59X751	RZK-004
RZC-011	White threaded knob	3X53	RZK-001
RZC-013	Crystal, spiral	58X125	RZW-002
RZC-017	Bezel - numeral, gold	53X123	RZA-006
RZC-017	Bezel spacer	59X788	RZJ-001
8 - RZC-018	Bezel, chrome finished, plastic	53X159	RZA-008
RZC-019	Fawn bezel (sprayed)	58X159	RZA-008

BOOK REVIEW

The Saturday Review Home Book of
Recorded Music and Sound Reproduction

by

Edward Tatnall Canby, C.G. Burke, and Irving Kolodin

Prentice-Hall, Inc.,
70 Fifth Ave., New York 11, New York
308 pages - $4.50

The three authors, known for their activities in the record and sound field, have each taken a portion of the book to treat one phase.

Canby offers a history of the recording industry, an explanation of mass reproduction and a description of recording techniques. Burke's section deals with a non-technical description of various equipment available to the record enthusiast. He attempts to evaluate equipment by make and performance. His analysis of the various systems does outline the high costs of good reproduction and for this reason should be of interest to the uninitiated. Kolodin contributes his analysis of music as it applies to reproduction. His text and list of recommendations should be a guide to the casual collector or the beginner.

An attempt has been made here to acquaint the reader with technical terms and descriptions in a non-technical fashion. The evaluation of commercial equipment may disappoint some because of its limited scope and because the introduction of newer equipment is so rapid that this portion will become obsolete. It will serve a useful purpose in relieving the retailer of the burden of explaining qualities and prices to the potential customer since the format and presentation makes for easy reading and assimilation of the material.

* * *

Littelfuse Official TV Fuse Guide
and Automotive Fuse Guide -

The Littelfuse Official TV Fuse Guide lists brand name, model numbers and corresponding fuse requirements on all makes and models, starting with the first sets and ending with those now on the market.

The Littelfuse Automotive Fuse Guide includes car radio fuses for all makes from 1940 through 1952 models.

The Fuse Guides are available, through Jobbers or by writing direct to Littelfuse, Inc., 1865 Miner St., Des Plaines, Illinois.

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Vol. 21, Nos. 213 & 214 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ July 15, 1953

BOOK REVIEW

Television and Radio Repairing
by John Markus

McGraw-Hill Book Company, Inc.
330 West 42nd St.,
New York 36, N. Y.
556 pages - $7.95

This book is written in the fine style of Mr. Markus who, as Associate Editor of "Electronics" and author of several other excellent texts, commands respect for his authoritative work.

Based upon the assumption that the reader has no previous experience in Radio or TV, this book starts with a definition of service and the basic tools used as well as outlining the service data needed, the ordering procedure for parts, shop equipment requirements and other facts so necessary for successful service operation. This approach is excellent since most authors stress the technical aspects of service and do not give the beginner any idea of the business operation.

The remainder of the book deals with fundamentals of components, circuitry and testing procedures. These chapters are intended to lead the reader into actual service work by giving him the information in a logical order.

The author states that before the reader is finished with the book he can fix 50% of the equipment he encounters and upon completion of the text can repair 75% of his service jobs. This would seem to be an optimistic estimate for the average reader who has no prior experience, although thorough study of this text will give him an excellent start in the involved field of Radio and TV Service.

* * *

FACTORY SERVICE HINTS

The following service hints on DuMont television receivers, originally published in DuMont Service News, are brought to you through the courtesy of Allen B. DuMont Laboratories, Inc.

Model RA-105, Photofact Set 72, Folder 8 and
Prod. Chge. Bul. 6, Set 108-1

Symptom: Picture fades out gradually and returns after a few minutes.

Probable Fault: Intermittent short in C41, the 5000 mmf. screen-bypass capacitor of the third video IF amplifier, V6.

Remedy: Replace C41.

Models RA-160, RA-162, Photofact Set 179, Folder 4
and Prod. Chge. Bul. 55, Set 189-1

Symptom: Tuner inoperative on high channels.

Probable Fault: Tuner B+ voltage low, R152 has increased in value.

Remedy: Replace R152.

\- - -

Symptom: Overloaded picture. AGC control has no effect.

Probable Fault: C60, .001 mf. coupling capacitor from the plate of the AGC gate V9, is shorted.

\- - -

Symptom: Critical vertical hold. Insufficient control adjustment range.

Probable Fault: C80 a .05 mf. capacitor in the first vertical clipper stage, V15, is open.

\- - -

Symptom: Decrease in horizontal size, no compression or foldover.

Probable Fault: C108, the .1 mf. capacitor at the yoke connector receptacle, is leaky.

\- - -

Symptom: Repeated loss of horizontal hold. After adjustment hold is OK for several days at a time.

Probable Fault: C99, the 1000 mmf. capacitor in the horizontal oscillator circuit, is changing value.

\- - -

Symptom: No raster, no horizontal sweep. Sweep components check OK.

Probable Fault: C58, 120 mf. coupling capacitor in the AGC gate circuit, V9, is shorted.

\- - -

Symptom: Loss of vertical and horizontal picture size.

Probable Fault: C5, 4 mf. capacitor in the cathode of the horizontal sweep amplifier, V20, is low in value.

Models RA-164, RA-165, Photofact Set 189, Folder 7 and Prod. Chge. Bul. 60, Set 194-1

Symptom: Receiver inoperative no sound, no picture. R37 and/or R61 charred.

Probable Fault: Internally shorted V4, V5 or V11.

Remedy: Replace shorted tube and resistors.

- - -

Symptom: Top lines of raster too bright, remain visible when the brightness control is turned down darkening the balance of the picture.

Probable Fault: C2 in the B+ boost circuit is open.

Remedy: Replace C2.

- - -

Symptom: Weak sound, poor contrast, 120 volt line low.

Probable Fault: C45 the coupling capacitor to the grid of the second audio amplifier, V11, is leaky.

Remedy: Replace C45.

- - -

Symptom: Noise in picture and sound, Christmas Tree effect or no high voltage.

Probable Fault: Arcing in 1B3GT, high-voltage rectifier socket.

Remedy: Replace socket.

- - -

Symptom: Horizontal-hold control cannot be adjusted to hold across its range. Poor contrast.

Probable Fault: R43, the 18K resistor in the screen grid circuit of the video amplifier has increased in value.

Remedy: Replace R43.

- - -

Symptom: Raster breakdown (small black lines in the raster) when the brightness control is turned up fully.

Probable Fault: C77, the high-voltage filter capacitor is breaking down.

Remedy: Replace C77.

- - -

Symptom: Hum or buzz in sound.

Probable Fault: Heater-cathode leakage in the 6AL5 ratio detector, V9.

Remedy: Replace V9.

- - -

Symptom: Tuner weak or inoperative.

Probable Fault: Tuner output tab shorted.

Remedy: Remove output tab. Run output lead directly to the mixer output coil.

- - -

Symptom: Poor horizontal hold. The horizontal-hold adjustments are very critical.

Probable Fault: Defective 6AL5, horizontal phase detector, V15.

Remedy: Replace V15.

- - -

Symptom: Poor picture contrast due to low video gain. The AGC voltage at the chassis test point can be varied from -5 to -40 volts by rotating the AGC control.

Probable Fault: Defective 12BY7 video amplifier.

- - -

Symptom: Picture overload. Cannot be corrected by readjusting the AGC control. Regeneration occurs over part of the control's range.

Probable Fault: The 1 mf. capacitor in the AGC line has opened. This capacitor is C35.

- - -

Symptom: Severe picture overload. AGC control has no effect. AGC voltage measured at chassis test point is lower than -2.5 volts regardless of the control's setting.

Probable Fault: The 1000 mmf. 2000 volt capacitor in the AGC amplifier circuit is open. This capacitor is C34.

- - -

Symptom: Poor lock-in range. Intermittent loss of horizontal sync. Slow picture fading.

Probable Fault: The 4 mf. capacitor in cathode circuit of the AGC amplifier is open. The item number of this capacitor is C4.

- - -

Symptom: Loss of high voltage.

Probable Fault: The 1000 mmf. coupling capacitor between the plate of the sync phase inverter and the horizontal AFC is leaky or shorted. This capacitor is C61.

- - -

Model RA-119A, Photofact Set 156, Folder 5

Symptom: No picture or raster. The filaments of the 5U4 power rectifiers on the main chassis are not lit. This condition can also occur in the high voltage supply chassis.

Probable Fault: B+ short, due to a defective filter component. Self regulating power transformers of the type used in the main and high-voltage supply chassis of this Teleset show up a B+ short by the loss of power rectifier filament voltage.

The PHOTOFACT Servicer

Vol. 21, Nos. 209 & 210 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ June 1, 1953

SERVICE HINTS

The following service hints covering the Capehart Television Chassis CX-36 are brought to you through the courtesy of Capehart-Farnsworth Corporation, Fort Wayne, Indiana. Originally published in Capehart Tech-Flash.

Chassis CX-36
Photofact Set 187, Folder 3

HV ARCING WITHIN THE HV SECTION

Some arcing inside of the HV Cage may be noted on early production chassis. This was found to be due to the proximity of the 1B3-GT Tube Cap to the metal cover of the HV Cage. Naturally, the arc will be noted only with the cover in place. This may be remedied in the field as it has been in production, by placing a 2 inch wide strip of plastic insulating tape across the entire width of the HV Section cover on the inside of the cover.

ELIMINATION OF BACKGROUND NOISE IN SOUND ON WEAK SIGNALS

The Signal-to-Noise ratio in the sound circuits on the "CX-36" Chassis has been reported as being very good in all Field Tests. However, a few reports have been received concerning an objectionable "frying" or "hissing" (background noise) in the sound under extreme weak signal conditions.

Following is a circuit change which is being incorporated in production. With these changes the production coding of the RF, IF Chassis will be changed to "R-2". This change has been tried in the field and proven successful in correcting the above condition in even the "weakest" signal.

1. Delete C47 (100uuf.) and R46 (680K).
2. Connect pin 7 of X-V7 (1st Sound IF) to junction of R34 and L22 by direct connection.
3. Change R48 from 100K to 10K.
4. Delete R49 and C52 (in cathode circuit of (V10).
5. Connect pin 7 of V10 to ground.

ELIMINATION OF BACKGROUND NOISE IN CX-36

Variation in characteristics of 6CB6 tubes used in the 1st and 2nd IF stages have caused a background "noise" or movement in the picture of a few CX-36 instruments. This condition has been noticed in only certain instruments and only part of the time in these instruments.

The reason for this background noise can be seen by referring to the CX-36 diagram and checking the AGC operation. From the diagram it will be seen that the RF and IF bias are derived from the same point. However, the RF bias is delayed so that as the signal increases, the RF bias will rise in value at a slower rate than IF bias. This difference in bias rise in the RF and IF sections had been designed so that an optimum signal-to-noise ratio was maintained for any given value of signal strength being received. When IF tubes are used that differ from the design characteristics (and 6CB6 tubes will vary, even from the same manufacturer) then the RF bias may rise too soon, decreasing the gain of the RF stage from what it should be for the signal being received. When this happens, the signal-to-noies ratio of the instrument is seriously impaired.

To allow this variation in tube characteristics to be corrected or adjusted for each chassis, the following change in the AGC amplifier wiring has been made:

1. Remove resister R66 (3.9 meg.) and connect a 3.3 meg. and a 680K resistor in series in its place with the 680K connected to pin 6 of V9.
2. Disconnect switch M5 (Noise Switch) from its present circuit and connect it across the 680K resistor.

Rewiring the circuit in this manner allows the value of R66 to be changed from 3.3 meg. to approximately 3.9 meg. at will. This will allow the difference in the RF and IF bias to be set for the particular tubes that the instrument has. When setting the instrument up, it is only necessary to place the switch in the position that reduces the background motion.

This change (with the switch known as the AGC Differential Control) will be incorporated in chassis coded D4 or higher.

CRITICAL VERTICAL SYNC

Cases of critical vertical sync in CX-36 chassis coded R2-D4 may be found to be due to capacitor C72 (.0022 mfd., 1000V). It has been found that a small quanity of these capacitors have been received that did not fall within the tolerance specified for this part.

Chassis having critical vertical sync that bear the R2-D4 code number should have this capacitor checked. If it does not fall within a tolerance of 20%, it should be replaced with a good unit.

PICTURE SMEARS IN CX-36

A few field reports have been received (from one city) concerning picture smear in early production CX-36 chassis. Investigation showed the sound carrier level of the transmitter to be somewhat higher than normal, in relation to the video carrier level.

In order to keep 4.5 MC out of the picture, at this high sound level the operator unconsciously set the local oscillator or fine tuning improperly, by moving the sound carrier farther away from the IF passband and moving the picture carrier up on the IF curve from the 6 db or half way point. The sound take-off and sound IF changes described previously were primarly made to reduce or eliminate background noise in sound on weak signals. These changes, however, also corrected the excessively high level of sound permitting the local oscillator, or fine tuning to be set at the proper point, resulting in a clean, sharp picture with good detail and no smear.

The effectiveness of this change and the need for it will depend entirely upon the local television transmitter.

Note that this change was placed in production approximately the last of July, identified by R-2 production run of the RF-IF chassis--run number is stamped on lower right corner of back panel of chassis.

SETTING OF AM REJECTION OF THE RATIO DETECTOR

Variations in 6AL5 tubes and ratio detector transformers have made it difficult to adjust the ratio detector for maximum rejection of AM signals. A new control will be added to the RF-IF chassis to facilitate the setting of the ratio detector transformer for maximum AM rejection. The chassis having this control will bear the code number of R3 for identification purposes.

In practice, the AM Rejection Controls a 200Ω rheostat connected in parallel with R51 (120Ω). This control will be mounted on the underneath side of the RF-IF chassis and will not be accessible as an installation adjustment. Initial adjustment will be made at the factory before shipment. If through replacement of the ratio detector transformer or tube, it becomes necessary to realign the sound IF the following procedure should be used:

1. Feed 4.5 MC signal with 400 cycle AM modulation into Pin 7 of V7 (6X8).
2. Connect oscilloscope set to view the 400 cycle modulation and a VTVM with zero center to Point "C".
3. Adjust the secondary (A12) of L29 for zero on the VTVM.
4. Adjust the AM Rejection Control for minimum modulation pattern on the scope. (Due to interaction of these two adjustments, they should be repeated several times to obtain the maximum amount of AM rejection and still have the ratio detector centered on 4.5 MC).

The balance of the sound IF alignment is unchanged. Move the scope to the junction of R51, R52, C53 and adjust A10 and A11 for maximum amplitude and balance of the "S" curve.

CX-36 CHANNEL INDICATOR LIGHT

Several reports have been received in the past months concerning the pilot light behind the channel knob on the CX-36. The sleeving on the pilot light was adjusted at the factory for proper position but invariably the sleeve would shift in shipment allowing the light to illuminate two or three channel numbers.

To correct this trouble, a smaller size sleeve has been used on the bulb. By providing a tighter fit between the bulb and the sleeve, most cases of the sleeve shifting should be eliminated.

IMPROVED NOISE LIMITING IN SOUND

In extreme fringe areas where reports are received of noise in sound, the following minor circuit change can be employed:

1. Change R50 (1000Ω), the plate load resistor for V10 the 2nd Sound IF Amplifier, to 22K.

This provided additional limiting action in the 2nd Sound IF Amplifier. The same effect can be obtained also, by adding a 47K resistor as screen dropping resistor in the 2nd Sound IF Stage (connected between terminal 3 of L29 and pin 6 of V10). In this case R50 would be left as it is and an additional bypass (5000MMF) would be needed at the screen grid.

If the chassis being worked on is a production run "R-1" it is suggested that the changes listed in "Elimination of Background Noise in Sound on Weak Signals" be first incorporated.

Cases of Weak sound, usually accompanied by noise in the sound will in most instances be found to be due to a weak Sound IF tube. This could also be caused by a change in value of some component in the Sound IF or possibly misalignment of Sound IF.

Reports have also been received of this same condition being caused by the 4.5 MC interstage coil having a few shorted turns. In cases of this kind it is not always possible to determine the trouble by visual or other inspections. If the coil displays a rather broad peak in tuning it should be replaced by a new one.

XMAS TREE EFFECT IN PICTURE AT LOW BRILLIANCE

This effect, which might be described by some as "Pie-Crusting" or "gear-tooth effect" has been reported as being apparent on some "CX-36" chassis when the Brightness Control is adjusted to a relatively low brilliance setting. The cause of this effect has been determined to be the result of a parasitic oscillation in the horizontal output circuit. By changing R124 (1K resistor in parallel with C98 in the horizontal output circuit) from 1K to 470Ω this effect can be eliminated.

HORIZONTAL PICTURE MOVEMENT ON CERTAIN SIGNALS

Scattered reports of horizontal movement in the picture have been received. This condition is not to

be confused with horizontal instability or jitter which may be caused by severe noise conditions in weak signal areas. On the contrary most cases reported have been under moderate signal conditions.

In many cases this condition has been found to be the result of variations in the AFC circuit of the sync generator at the transmitter. Many transmitting stations employ sync generators which are controlled by reactance tube AFC systems, similiar to that employed in the "CX-36" chassis. Variations that may occur in the AFC circuit at the transmitter can have a direct influence on the horizontal stability of receivers using a similiar AFC system. The time constants employed in the reactance tube circuit of the transmitter sync generator and the receiver AFC System should be approximately the same in order to provide optimum horizontal stability at the receiver. Any wide variation of the difference in the two time constants may cause horizontal jitter. Also variations in line voltage or variations in B plus voltage in the reactance tube stage at the transmitter will cause the sync generator to be unstable which in turn will result in horizontal instability at the receiver. Many stations will use more than one sync generator, even during the course of one particular program, therefore the condition at the receiver will probably be intermittent. You may note that this condition does not exist on network programs or possibly it is only noticed when the station is transmitting a local film program.

There is very little that a service technician can do about difficulties that stem from transmitter troubles, other than to report any suspected difficulties to the transmitter engineers. However, the technician can save himself much time if he will learn to recognize such troubles when they exist.

We have found from trial and investigation in the field that when AFC variations at the transmitter cause intermittent picture shift on a "CX-36" chassis, the condition can be alleviated by removing resistor, R104 and capacitor, C81 in the AFC delay network. This decreases the time constant of this circuit allowing the AFC system to respond more quickly to the variations at the transmitter. Thus, the variations are not removed (since it would be impossible to do this at the receiver) but, they are speeded-up to the point where they are not noticable by the human eye.

POSSIBLE CAUSES AND CORRECTIONS FOR HORIZONTAL OSCILLATOR DRIFT AND PHASE SHIFT IN "CX-36" SERIES TV CHASSIS

The following information is presented as an aid to the service technician in endeavoring to service a CX-36 series chassis which shows evidence of horizontal instability. A few reports have been received which indicate the possibility of drift in the horizontal oscillator frequency and phasing circuits. In these cases a gradual change in horizontal phase or frequency may result after the set up adjustments have been properly made. In other cases, the loss of horizontal sync has been found to be caused by a defective 12AT7 and in others it has been found to be due to mechanical variation of the horizontal oscillator transformer windings caused by vibration or shock. Suggestions are made in the following paragraphs which should assist in checking to determine the cause and also applying a correction.

The technician should not overlook the more common causes of horizontal instability such as - defective Sync Clipper - Horiz. AFC (12AT7), defective Horiz. Disc. tube (6AL5), open or leaky sync coupling capacitors or misadjustment of set-up controls. In every case the receiver in question should be first adjusted according to the procedure outlined in the Set-Up Instructions and then an Oscilloscope should be used to trace the sync pulse through to its point of injection at the AFC circuit. If this procedure is followed and horizontal instability or drift is evident, one or more of the following may be the cause:

1. Horizontal Instability Due to Loose Coil Forms (L30).

   Check for "play" in adjustment slugs of L30, the horizontal oscillator transformer. Make certain that the coil forms of this transformer are held rigidly in place by the mounting clips. If "play" exists apply gluptol to secure forms to mounting bracket.

2. Horizontal Instability Caused by Defective Reactance Tube.

   Some 12AT7 tubes have been reported as developing secondary emission in which case this would be evidenced by the grid going positive. Check the grid voltage with a VTVM at the junction of R105 and R109. It should read zero with the 6AL5 removed or with the 6AL5 in place when horizontal frequency and phasing are properly set. If the reading is positive:

   a. Replace the tube.
   b. Change R108 (plate load for V16) from 5.6K to 18K, 2 watt (Part No. 3235-183).
   c. Change R113 (plate load for V20) from 5.6K to 15K, 2 watt (Part No. 3235-153).

3. Horizontal Phase Shift or Oscillator Drift.

   If the initially correct adjustments of the frequency and phasing slugs require readjustment after a period of operation:

   a. Remove C86, .0033ufd capacitor.
   b. Connect the parallel combination of one (1) 1200uuf Silver Mica (Part No. 750272A-44) and two (2) 1100uuf, N750 (Part No. 650261A-18) Capacitors from terminal "C" to terminal "B" of L30, horizontal oscillator transformer.
   c. Remove C84, .0047ufd capacitor.
   d. Connect the parallel combination of one (1) 500uuf, N1400 (Part No. 650030A-20) and three (3) 1400uuf, N1400 (Part No. 650030A-19) capacitors from terminal "D" to terminal "F" of L30.

After making these changes, repeat the horizontal oscillator adjustment procedure.

Capehart Model TC-20
Photofact Set 132, Folder 4

IMPROVING AM SENSITIVITY IN AREAS OF LOW SIGNAL STRENGTH

Increased performance can be obtained from the TC-20 Clock Radio by making two circuit changes. Overall sensitivity of the set can be increased by changing the cathode resistor (R4) of the IF amplifier from 150Ω to 100Ω. Audio output can be increased by shunting the cathode resistor (R7) of the audio output stage with a 25 mfd. 25V electrolytic capacitor. Part numbers of parts needed:

PART NO.	DESCRIPTION
650228A-7	25mfd. 25V Electrolytic Capacitor
3229-101	100Ω ½W 10% Resistor

CLOCK CONTROL KNOBS

Clock control knobs are now available in colors that match the color of the cabinets on the TC-20 clock radio. These colored knobs are being supplied in lieu of the gold knobs that are listed in the manual parts lists for these sets.

Knobs for the TC-20 clock radio will not be available to match the Green and Grey-Plum cabinets. A substitution of Ivory should be made with these particular colors.

The part numbers covering these knobs are:

Clock Knob (Blue-Grey)	453134A-1
Clock Knob (Maroon)	453134A-2
Clock Knob (Ivory)	453134A-4
Clock Knob (Black)	453134A-5

REMOVING THE TC-20 CLOCK ESCUTCHEON

Care must be exercised in removing the plastic faceplate from the front of the TC-20 Clock Radios to prevent the countersunk holes from cracking out. Removal of the four Tinnerman clips from the ornamental brass studs requires that considerable pressure be exerted on the faceplate. A simple method to remove the faceplate without damaging same, is to clip the end of the ornamental stud, with a pair of side-cutters as close to the Tinnerman clip as possible. A small screwdriver is then inserted in the slot on the clip and a small amount of prying will release the clip. For the difference in price between the ornamental studs and the faceplate, it is advisable to deliberately destroy the four, inexpensive, ornamental studs to prevent damage to the more expensive faceplate. Replacement ornamental studs stocked under part number 452235A-1.

Model 10
Photofact Set 166, Folder 7

The Model 10 cabinet has been reinforced by an enlarged ridge on the edge of the cabinet front where the front and cabinet back meet. The cabinets that are being used at present have a cutout molded on the cabinet back in the proper place so that the two halves of the shell fit snugly together.

When a replacement cabinet front is ordered, it will be found that the new style front, Part No. 452815A-GL, and the old style back, Part No. 750278A-1, will not fit together. To properly match the old back to a new front, it will be necessary to cut a small notch on the edge of the back at the point where it meets the reinforcement ridge on the cabinet front. Outline the required notch on the back with a pencil. The outline of the notch can then be cut with a sharp knife or scribe, a pair of long nose pliers can then be used to break the notch out. The rough edges and burrs that remain can be removed with a file.

No modifications such as outlined above will be necessary when a complete replacement cabinet is used or when one of the new style backs is installed on an old style front. Cabinets now stocked for replacement contain the reinforcing ridge and cutout.

NEW PRODUCTS

Described as the world's smallest transformer, an ultra-miniature transistor transformer has been introduced by the Standard Transformer Corporation, Chicago.

Weighing less than one-tenth of an ounce, the tiny Stancor transistor transformers measure as little as one-fourth by three-eighths by three-eighths of an inch and are no larger than the transistors they are designed to power. While they are intended primarily for transistor audio applications, the ultra-miniature transformers can be used wherever low power is involved, Stancor engineers said. Useful below 1 mw level, they are constructed of extremely fine wire, wound on molded nylon bobbins, with special nickel alloy steel laminations.

The following ultra-miniture units are available through Stancor distributors:

UM-110, UM-113 - Interstage
UM-111, UM-114 - Output or Matching
UM-112 - High Impedance Michrophone Input

Special Stancor ultra-miniature transistor transformers, designed and built to individual requirements, also are available.

ADDITIONAL PHOTOFACT SERVICING AID

Photofact folders covering television receivers employing series or series-parallel combination filament arrangement, will incorporate a schematic of the filament string on the same page as the Tube Placement Chart, Top View. It will thereby be quickly possible to determine all of the tubes affected by an open filament in any one.

Within a year's time the following have been incorporated on this same page:

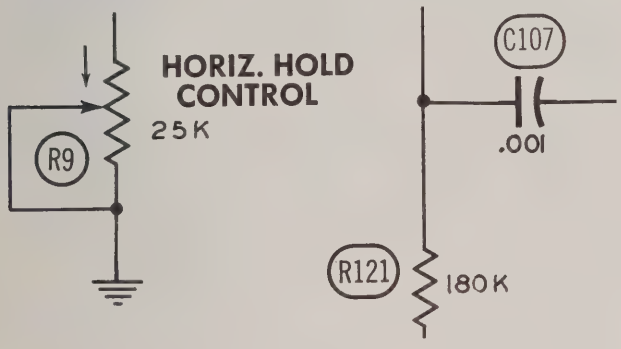
1. Tube Failure Check Chart.
2. Fuse placement, rating and circuit.
3. Tubes marked to indicate blank pin or locating key.

The PHOTOFACT Servicer

Vol. 26, Nos. 259 & 260 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ September 15, 1954

PHOTOFACT FOLDERS

Two recent service aids have been added to TV PHOTOFACT Folders. Control rotation information has been added on the Schematic Diagram and connection information is now being included in the Parts List on Horizontal Output Transformers. We are sure you will find these to be helpful. An example of each is shown below.



ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

***HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA**

Use Original Width Coil Unless Replacement Type Is Listed

	ORIGINAL TERMINAL CONNECTIONS	Stancor Replacement Connections	Merit Replacement Connections	Triad Replacement Connections	RCA Replacement Connections	Halldorson Replacement Connections	Thordarson Replacement Connections
	8	8	1B3 Rect. Plate Lead	1B3 Rect. Plate Lead	1B3 Rect Plate Lead	8	1B3 Rect Plate Lead
	7	7	9	9	9	7	9
	6	6		8	8	6	8
	5	5	NC	7	7	5	7
	4	4	5	5	5	4	5
	3	3	4	4	4	3	4
	2	2	3	3	3	2	3
	1	1	1	1	1	1	1
Connect Width Coil Across →	9 & 10	Pri. WC-5 Across 1 & 2	Pri. of MWC-1 across 1 & 3	Pri. of WC-11 Across 1 & 3	Pri. of 214R1 Across 1 & 3	Pri. of RF800 Across 1 & 2	Pri.of WC-20 Across 1 & 3
Special Notes →		⑥	⑦	⑥	⑥	⑥	⑥

FACTORY SERVICE HINTS

The following service hints covering DuMont Television receivers are brought to you through the courtesy of Allen B. DuMont Laboratories, Inc.

Chassis RA-306, RA-307
Photofact Set 241, Folder 6

Symptom: The left half of the CRT is in focus while the right side is out of focus. Readjustment of the ion-trap does not remedy the condition.

Probable Fault: R100, the 15K resistor located on the horizontal flyback transformer, has lost value or is shorted out of the circuit.

Symptom: Heavy horizontal sound bars in the picture when the volume control is adjusted for normal or loud sound. The bars cause the picture to wobble vertically and horizontally. At high volume levels the vertical hold control adjustment is critical.

Probable Fault: C20, the 40 MFD, 200 volt filter capacitor for the B+ 125 volt line, is open or has lost value. This capacitor is part of a four section filter located on the chassis adjacent to the audio output V13.

Symptom: Regeneration in the picture when weak or moderate signals are received. The regeneration appears as heavy smearing noise streaks across the picture. The presence of regeneration may be checked by removing the antenna from the set, shorting the antenna input terminals and observing the noise on the raster.

Probable Fault: L29, the violet colored peaking coil, in the video amplifier grid circuit, is open, or R39, the 3.3K resistor in the same circuit, has increased in value or is open.

Symptom: Critical sync, accompanied by a severe hook at the top of the picture.

Probable Fault: C105, the 10000 MMF, capacitor in the video detector (V7) plate bias circuit, is shorted.

Symptom: Horizontal wobble in picture.

Probable Fault: C80, the .022 MFD, 600-volt coupling capacitor, at the grid of the sync separator, is leaky; and/or R80, the 2.2 Meg, 1/2 W resistor, in the same circuit, has changed value.

Symptom: Loss of horizontal hold. Adjusting the horizontal stabilizer coil, L37 locks the picture in horizontally, however the horizontal hold control is only effective over a narrow portion of its range.

Probable Fault: C95 (.001 MFD, 600 volts) located between the 12AT7 and the 6AL5, is open.

Symptom: Intermittent loss of vertical and horizontal hold, accompanied by a severe vertical jitter. The hold controls have no effect in correcting the trouble.

Probable Fault: R80 (2.2 Meg, 10%, 1/2 W) located in the 6BE6 first sync clipper circuit, has increased in value.

Symptom: Picture overload. Adjustment of the AGC control does not correct the trouble.

Probable Fault: C62 (1000 MMF, 2000 volts) the coupling capacitor feeding the keying pulse to the 6AU6 AGC keying, is open.

Symptom: Approximately 20 horizontal bars drifting vertically in the picture. The vertical hold control adjustment is critical.

Probable Fault: C65 (.1 MFD, 200 volts) the filter capacitor in the tuner AGC line, is open.

Symptom: Vertical fold over in the center of the picture. The picture is approximately three inches high.

Probable Fault: C89 (.01 MFD, 1600 volts) located in the vertical multivibrator circuit, is open.

Symptom: No raster, sound is normal.

Probable Fault: C104 (.0047 MFD, 600 volts), the 6BQ6 horizontal deflection amplifier coupling capacitor, is leaky.

Symptom: Picture size collapses vertically. This condition may occur continuously or intermittently.

Probable Fault: C91 (470 MMF, 2000 volts) connected between the red lead of the vertical output transformer T3 and vertical multivibrator feed back network, is shorted.

Symptom: No raster, slight buzz is heard in the speaker.

Probable Fault: C97 (.15 MFD, 600 volts) the capacitor feeding the horizontal sweep pulse to the 6AL5 horizontal AFC, is open.

Symptom: Complete loss of vertical and horizontal hold. The hold controls have no effect.

Probable Fault: C83 (.022 MFD, 200 volts) the coupling capacitor between V14 and V15A, is open.

Symptom: Overloaded pictures. Adjusting the AGC control does not correct the trouble.

Probable Fault: C63 (.22 MFD, 200 volts) the filter capacitor on the AGC network, is shorted.

Symptom: Insufficient horizontal size. R119 (3.3K, 10%, 2 W), the resistor in the B+ boost circuit, is overheating.

Probable Fault: C107 (.033 MFD, 10%, 600 volts) the capacitor in the B+ boost circuit, is open.

Remedy: Replace C107 and R119.

Symptom: Overloaded pictures, adjusting the AGC control has no effect. A slight buzz is heard in the speaker.

Probable Fault: L33 the peaking coil in the plate circuit of the 12BY7 video amplifier, is open.

Symptom: Picture rolls vertically. The Vertical Hold control has little effect and does not stop the picture roll. Adjusting the Vertical Linearity control stops the picture roll and two pictures, one over the other appear.

Probable Fault: C90 (.0022 MFD, 10%, 400 volts), the capacitor in the feed back circuit of the vertical multivibrator, is shorted.

Symptom: Intermittent decrease in vertical picture size accompanied with a weak buzz in the sound. The buzz is at the frequency of the vertical oscillator.

Probable Fault: C3 (10 MFD, 350 volts) the semi-polarized B+ boost capacitor is leaky.

Symptom: Severe picture hook. The hook disappears or becomes less noticable when the AGC control is rotated in a clockwise direction.

Probable Fault: C2B (10 MFD, 400 volts), the 12BY7 video output screen bypass capacitor, is open.

Symptom: Critical horizontal and vertical hold. The hold controls must be adjusted with extreme care.

Probable Fault: C82 (.1 MFD, 200 volts) the screen bypass capacitor for the 6BE6 (V14), is shorted.

Symptom: Insufficient picture contrast. Black areas of the picture appear grey. Adjustment of the contrast and AGC controls does not improve the picture.

Probable Fault: L31, the violet colored coded peaking coil in the plate circuit of the 12BY7 video output, is open.

Symptom: No raster. A slight buzz is heard in the speaker.

Probable Fault: R105 (12 ohm, 1 W) resistor in the 6AL5 (V17), has increased in value.

Symptom: The picture appears OK, but the Contrast control has no effect upon the picture.

Probable Fault: R44 (1.8K, 10%, 1/2 W) resistor connecting the Contrast control to the + 145 volt line, is open.

Symptom: No horizontal hold, picture size is reduced vertically.

Probable Fault: R3A (50K, 1/4 W), the Horizontal-Hold control, is open.

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RETMA PRODUCTION SOURCE CODE

The following companies have been added to the RETMA Production Source Code list of January 1954. This list supplements the listing appearing in the PHOTOFACT Servicer included with Set 246.

COMPANY	CODE NO.
ACF Electronics, Division of ACF Industries, Inc., Alexandria, Va.	900
*Aerocoil, Inc., Jersey City, N. J.	908
*Aerolite Electronics Corp., Union City, N. J.	910
Allied Research & Engineering Inc., Hollywood 38, Calif.	905
*American Transformer Corp., Chicago 7, Ill.	892
Calvideo Tube Corporation, Los Angeles 45, Calif.	886
Cargo Packers Inc., Brooklyn 11, N. Y.	901
*Centran Incorporated, Greensburg, Ind.	914
*Chester Cable Corp., Chester, N. Y.	909
*Coilcraft, Incorporated, Cary, Ill.	906
Condenser Manufacturers, Inc., Nashville 4, Tenn.	885
Connector Corporation, Chicago 30, Ill.	888
Consolidated Vultee Aircraft Corp., Pomona, Calif.	898
*CRT Electronics Corp., Mount Vernon, N. Y.	884
D & M Products, Detroit 3, Mich.	903
*Dinion Coil Co., Inc., Caledonia, N. Y.	895
Elcon Electronics Inc., Brooklyn 32, N. Y.	893
Elgin Metalformers Corporation, Elgin, Ill.	902
General Products Corp., Union Springs, N. Y.	913
*Helgason Electric Manufacturing Corp., North Manchester, Ind.	899
Hy-Gain Television Products, Lincoln, Nebr.	894
*I-T-E Circuit Breaker Company, Philadelphia 30, Penna.	912
International Electronic Industries Inc., Nashville 1, Tenn.	911
International Telemeter Corp., Los Angeles 25, Calif.	887
*Mohawk Electronics Corp., Chicago 10, Ill.	883
Pan-Electronics Corporation, Atlanta, Ga.	904
Plamondon Magnetics Company, Chicago 22, Ill.	882
*Polyphase Engineering, Chicago 22, Ill.	889
Resistron Laboratories, Inc., West Los Angeles 25, Calif.	917
*Rollins Corporation, Lewes, Del.	915
*Senn Corporation, New Augusta, Ind.	907
Southern Electronics Company, Greeneville, Tenn.	891
Texas Electronics Mfg. Co., Inc., Houston, Texas	916
TRESCO (Transformer & Electronic Specialities Co.), Philadelphia 28, Penna.	897
Unitek Corporation, Pasadena 8, Calif.	881
Viking Electric, Los Angeles 17, Calif.	896
Wire Company of America, Santa Barbara, Calif.	890

(*) Indicates Non-Members

CODE NO.	COMPANY
881	Unitek Corporation, Pasadena 8, Calif.
882	Plamondon Magnetics Company, Chicago 22, Ill.
883	*Mohawk Electronics Corp., Chicago 10, Ill.
884	*CRT Electronics Corporation, Mount Vernon, N. Y.
885	Condenser Manufacturers, Inc., Nashville 4, Tenn.
886	Calvideo Tube Corporation, Los Angeles 45, Calif.
887	International Telemeter Corp., Los Angeles 25, Calif.
888	Connector Corporation, Chicago 30, Ill.
889	*Polyphase Engineering, Chicago 22, Ill.
890	Wire Company of America, Santa Barbara, Calif.
891	Southern Electronics Company, Greeneville, Tenn.
892	*American Transformer Corp., Chicago 7, Ill.
893	Elcon Electronics Inc., Brooklyn 32, N. Y.
894	Hy-Gain Television Products, Lincoln Nebr.
895	*Dinion Coil Co., Inc., Caledonia, N. Y.
896	Viking Electric, Los Angeles 17, Calif.
897	TRESCO (Transformer & Electronic Specialities Co.), Philadelphia 28, Penna.
898	Consolidated Vultee Aircraft Corp., Pomona, Calif.
899	*Helgason Electric Manufacturing Corp., North Manchester, Ind.
900	ACF Electronics, Division of ACF Industries Inc., Alexandria, Va.
901	Cargo Packers Inc., Brooklyn 11, N. Y.
902	Elgin Metalformers Corporation, Elgin, Ill.
903	D & M Products, Detroit 3, Mich.
904	Pan-Electronics Corporation, Atlanta, Ga.
905	Allied Research & Engineering, Inc., Hollywood 38, Calif.
906	*Coilcraft, Incorporated, Cary, Ill.
907	*Senn Corporation, New Augusta, Ind.
908	*Aerocoil, Inc., Jersey City, N. J.
909	*Chester Cable Corp., Chester, N. Y.
910	*Aerolite Electronics Corp., Union City, N. J.
911	International Electronic Industries Inc., Nashville 1, Tenn.
912	*I-T-E Circuit Breaker Company, Philadelphia 30, Penna.
913	General Products Corp., Union Springs, N. Y.
914	*Centran Incorporated, Greensburg, Ind.
915	*Rollins Corporation, Lewes, Del.
916	Texas Electronics Mfg. Co., Inc., Houston, Texas
917	Resistron Laboratories, Inc., West Los Angeles 25, Calif.

FIELD SERVICE HINTS

The following service hints covering Wells-Gardner Television receivers are brought to you through the courtesy of Wells-Gardner & Co., Chicago, Illinois.

MS31 Chassis
Photofact Set 194, Folder 12
MS39 Chassis
Photofact Set 226, Folder 11

Subject: 26A548 Picture Tube Conversion Kit. A field conversion kit to use a 21YP4 all glass tube for a 21MP4 has been made available. This kit includes front mounting bracket, high-voltage box, rear cover for picture tube and a new anode connector. Detailed instructions for the conversion are also included with each kit. It is suggested that the 21YP4 and conversion kit be installed whenever a 21MP4 tube becomes weak or defective.

INSTRUCTIONS FOR INSTALLATION

1. Remove the chassis carefully from the cabinet.

2. Disconnect picture tube socket and remove ion trap magnet and centering device.

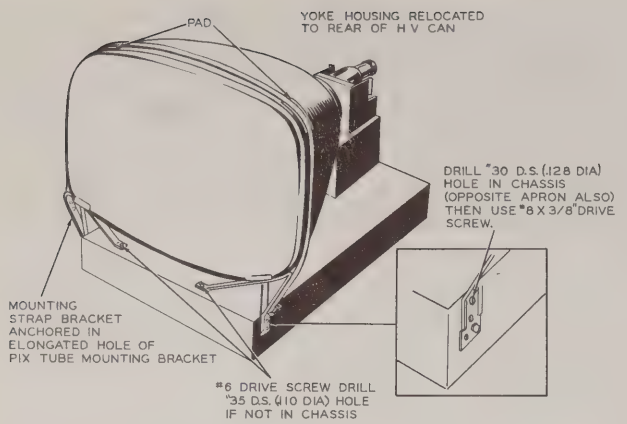

PAD
YOKE HOUSING RELOCATED TO REAR OF H V CAN
DRILL "30 D.S. (.128 DIA) HOLE IN CHASSIS (OPPOSITE APRON ALSO) THEN USE "8 X 3/8" DRIVE SCREW.
MOUNTING STRAP BRACKET ANCHORED IN ELONGATED HOLE OF PIX TUBE MOUNTING BRACKET
#6 DRIVE SCREW DRILL "35 D.S. (.110 DIA) HOLE IF NOT IN CHASSIS

Figure 1

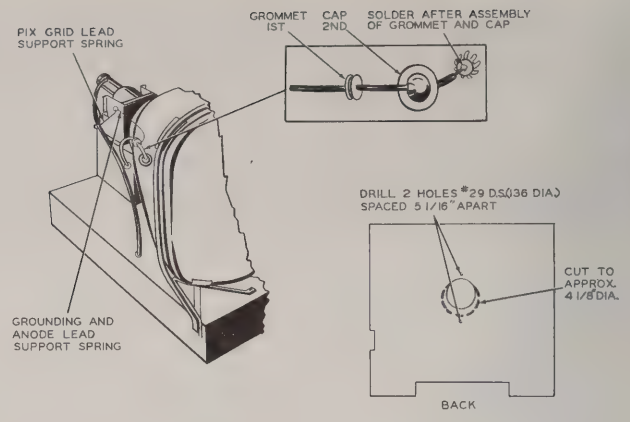

PIX GRID LEAD SUPPORT SPRING
GROMMET 1ST
CAP 2ND
SOLDER AFTER ASSEMBLY OF GROMMET AND CAP
DRILL 2 HOLES #29 D.S.(.136 DIA.) SPACED 5 1/16" APART
CUT TO APPROX. 4 1/8" DIA.
GROUNDING AND ANODE LEAD SUPPORT SPRING
BACK

Figure 2

3. Remove the picture tube harness and the metal picture tube.

4. Remove the front picture tube brackets (replace pilot light socket assembly using the short screw removed from the right side apron of the chassis) and the high voltage can.

NOTE: If high voltage can has beveled edge at the front do not remove. Beveled edge provides clearance for the glass picture tube.

5. Install the new high voltage can and relocate the yoke housing bracket so that it is almost flush with the back end of the high voltage can.

6. Remove the five screws and the back plate from the old high voltage can and assemble to the new high voltage can.

7. Install front picture tube mounting brackets using the screws that were removed from the old mounting brackets. (See Figure 1.)

8. Install glass picture tube and assemble mounting strap. Place rubber strips between top corners of picture tube and strap.

IMPORTANT: Strap must be kept close to line that encircles tube circumference.

9. Fasten the mounting strap with the same screw and nut used in mounting old mounting strap.

10. Unsolder metal contact from the anode lead and assemble the rubber cap, connector and grommet as shown in Figure 2.

11. Unscrew the picture grid lead support spring from the side of the yoke bracket and install a ground and anode lead support spring together with the picture grid lead support spring to the yoke bracket with a #8 lockwasher and a #8 x 3/8" screw. (See Figure 2 for completed layout.)

12. Remove picture tube neck cup from cabinet back and install new cup part number 57X232 (Figure 2) using the #6-32 x 3/8 screw #6 lockwasher and #6-32 hex nut.

13. Rework the tube layout label on the cabinet back and on the back cover of the high voltage can to read "21YP4 Picture Tube" in place of 21MP4 picture tube.

14. On the UHF models the dial glass mounting is held by wing nuts. Remove the wing nuts and attach the tube front support brackets to the chassis. Re-use the wing nuts to hold the support brackets at the front.

15. Replace the cabinet back on the receiver and use the #4-8 x 5/8 Phillips Round Recessed Hd. Type A screws in place of the screws used previously.

CONTENTS OF CONVERSION KIT (26A548)

No. Used	Part No.	Description
1	S-34X28	Hi-Voltage Housing Assembly
1	S-25X118	Tube Mtg. Strap Assembly
1	S-25X116	Tube Front Support Bracket Assembly, R. H.
1	S-25X117	Tube Front Support Bracket Assembly, L. H.
1	28X614	Anode Connector
1	8X243	Anode Connector Cover
1	6X73	Grommet
1	28X613	Grounding Spring
1		#8 Lockwasher, E. I. T. #4008-14-00, Cad. Pl.
1	28X599	Spring, Support
1	57X232	Cover Plate
2		#6-32 x 3/8 Slotted H. H. M. S., Steel
2		#6 E. T. or I. T. Lockwasher Cad. Pl.
2		#6-32 Hex Nut
4		#8 x 5/8 Phillips Rd. Recessed Hd. Type A Screw, Steel, Cad. Pl.
2		#6 x 3/8 Slotted H. H. Type Z Screw, Steel, Cad. Pl.
1	69X2784	Instructions

The PHOTOFACT Servicer

Vol. 26, Nos. 255 & 256 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ August 1, 1954

The following information on the Alliance Tenna-Rotor Model U-83 is presented through the courtesy of Alliance Manufacturing Co., Alliance, Ohio.

GENERAL INFORMATION

The Alliance Tenna-Rotor Model U-83 is a fully automatic unit. The control knob is turned to the desired direction and the rotator automatically rotates the antenna to that position and stops. The dial lights up when the direction is selected and turns off when the antenna reaches that position. This unit operates at a speed of two RPM, with a motor brake to prevent drifting and windmilling. Model U-83 can be identified by the grey neoprene weather shield and the new style rotator housing.

SERVICING PROCEDURE

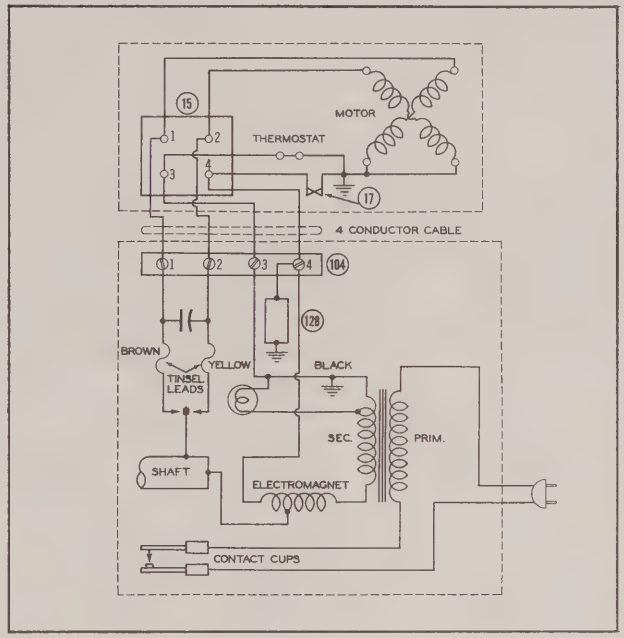
Power-off Checks-

1. Viewing from front, left pawl (Item #118) should clear slotted escapement disk by .020 inch with electromagnet in energized position. Adjust by bending electromagnet armature tip (Item #117).

2. Right pawl (Item #118) should clear slotted escapement disk by .020 inch with electromagnet in de-energized position. Adjust by bending tab on electromagnet assembly. (This tab also holds down the armature.)

3. Left pawl must come to rest in any given stop position. After stop position is reached, depress armature against electromagnet by hand to make sure pawl drops freely into slot. Adjustment is made by moving indent spring assembly (Item #126).

4. Contact switch (Item #17) in the rotator unit must make contact only when cam lobe (Item #24) comes in contact with the switch. If shaft assembly (Item #4) is removed from rotator unit, cam lobes must be 1/2 turn away from contact points in end-stop position on both directions.



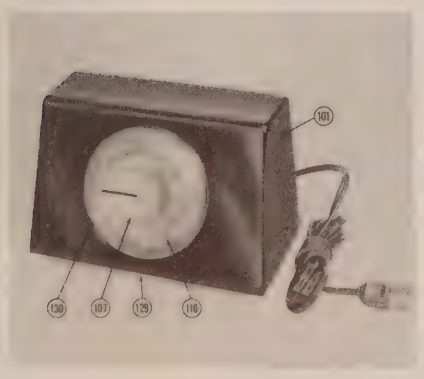
5. Be sure that four-conductor cable is connected to proper terminals. Terminal No. 1 in the rotator connects to No. 1 on the control box, and so on with No's. 2, 3, and 4.

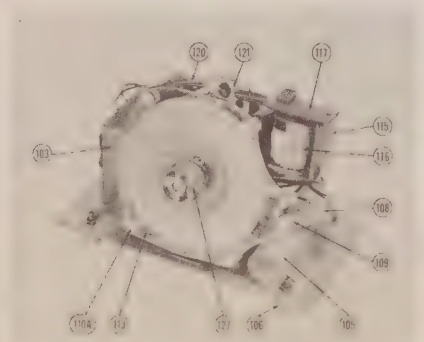
6. Primary input contacts should be .020 inch apart. Adjustment can be made at factory only.

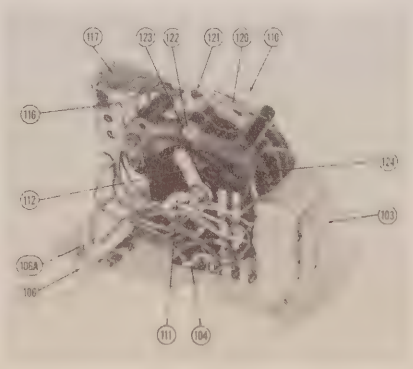
7. Red pointer on dial face should point to the direction which corresponds with the antenna at the stop position. This adjustment is made by removing the knob and inserting a narrow tool through the elongated radial slot to the gripping holes in the pointer, and turning the pointer to the correct position.

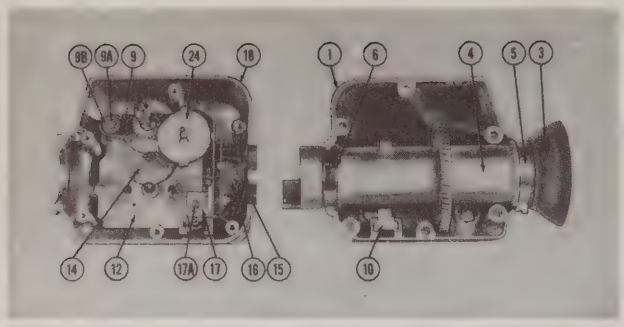
Power-on Checks-

1. Line voltage should be approximately 115 volts.



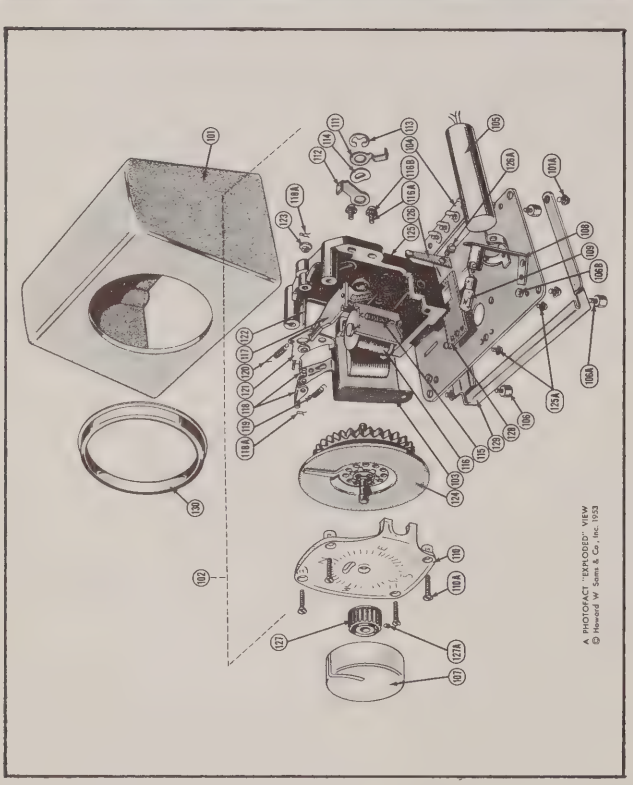


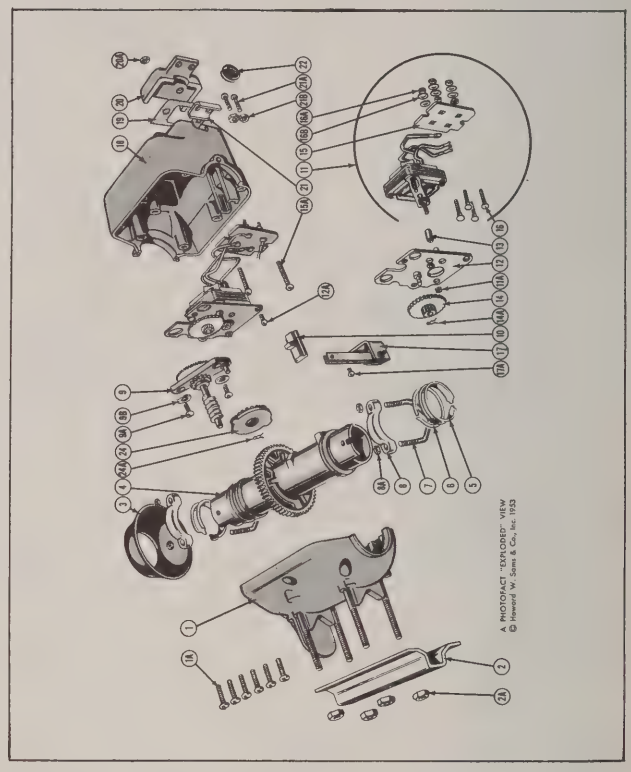




2. Turn knob (Item #107) to extreme counter-clockwise stop. Electromagnet must not buzz and mechanism must move correctly, no sticking or slipping. Rotator must turn to extreme counter-clockwise stop and light must turn off when rotator reaches the stop.

3. Turn knob (Item #107) to extreme clockwise stop. Rotator must return to extreme clockwise position and the light must go off when the rotator reaches the stop.





PARTS LIST

ITEM	NAME	PART No.
	Rotator Assembly	Z-5471-R
1	Housing Assembly, RH	Y-5454-R
1A	Housing Screws	10-32x3/4
2	Clamping Plate	X-5456-A
2A	Nut, Hex	1/4-20
3	Weather Shield	Y-3375-C
4	Shaft Assembly	Y-5463-R
5	Bearing Collar	X-3987-A
6	Thrust Washer	X-3376-A
7	U-Bolt	X-3377-A
8	Mast Clamp	X-3319-A
8A	Nut, Hex	10-32
9	Worm Assembly	Y-5474-R
9A	Screw, RHM	8-32x3/8
9B	Washer	#8
10	Stop Slide	X-3320-A
11	Motor & Term Assembly	Y-5472-R
11A	Nut, Hex	6-32
12	Mounting Plate Assembly	X-4263-R
12A	Screw, RHM	8-32x3/8
13	Spacers	X-4141-A
14	Gear & Pinion Assembly	X-3373-R
14A	Hairpin Cotter	S-604-A
15	Terminal Plate	X-4253-A
15A	Screw, RHM	8-32x1
16	Bolt, Carriage	8-32x5/8
16A	Nut, Hex	8-32
16B	Washer	#8
17	Contact Switch Assembly	Y-4323-R
17A	Screw, RHM	6-32x3/16
18	Housing Assembly, LH	Z-5326-B
19	Gasket	X-5449-A
20	Terminal Cover	Y-5327-A
20A	Nut	8-32
21	Strain Relief Clamp	X-3380-A
21A	Screw, RHM	6-32x1/2
22	Grommet	X-11-D
24	Cam & Gear	X-5584-B
24A	Hairpin Cotter	S-604-C

ITEM	NAME	PART No.
	Control Box Complete	Z-5500-R
101	Case	W-5559-A
101A	Screw, RHM	8-32x3/8
102	Frame & Dial Assembly	Z-5539-S
103	Transformer	Y-5512-A
104	Terminal Strip Assembly	X-3803-S
105	Capacitor	X-4098-A
106	Bumper (feet)	X-5628-A
106A	Screw, RHM	6-32x1/2
106B	Nut, Hex	6-32
107	Knob	Y-5556-R
108	Bulb Socket Assembly	Y-5558-R
109	Bulb (Type 47)	X-4274-A
110	Dial	Y-5554-A
110A	Screw, Self-tapping	S-603-K (#6-20)
111	Terminal	X-5540-A
112	Stop Lever	X-5537-A
113	Retaining Ring	X-4243-B
114	Spring Washer	X-5568-A
115	Spring	X-5595-A
116	Electromagnet Assembly	Y-5541-R
116A	Screw, RHM	6-32x1/2
116B	Lockwasher	#6
117	Armature	X-5547-A
118	Pawl	X-5523-A
118A	Hairpin Cotter	S-604-A
119	Pawl Spring	X-5667-A
120	Tension Spring	X-5569-A
121	Pawl Lifter Assembly	X-5521-R
122	Pawl Shaft	X-5552-A
123	Bushing	X-5520-A
124	Detent Body Assembly	Z-5524-R
125	Frame Assembly	Z-5515-R
125A	Screw, RHM	6-32x3/8
126	Indent Spring Assembly	X-5518-R
126A	Screw, RHM	6-32x3/8
127	Knob Hub	X-5555-A
127A	Set Screw	S-614-N
128	Tuning Spring	X-5563-A
129	Emblem Strip	Y-5557-C
130	Bezel	X-5560-A

The PHOTOFACT Servicer

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FIELD EXPERIENCES

For every "Field Experience" published, we issue a certificate good for one PHOTOFACT Folder Set. Awards are issued at the time of publication. Since it is impossible to verify the accuracy of contributions, we cannot be responsible for either the diagnosis made of the receiver trouble, or the results which will be obtained by following the suggested repair routine. All contributions become the property of Howard W. Sams & Co., Inc.

RCA VICTOR Model 21T303
Photofact Set 207, Folder 7

This receiver was operating in a fringe area with an indoor antenna. The picture was fairly good but the customer wanted an improvement. He was sold on antenna installation.

When the outside antenna was connected to the receiver the picture was worse - actually all snow. Replacing again with indoor antenna, the picture improved.

The entire roof was probed and a place found with plenty of signal, however the picture was still bad using the outside antenna.

A chack on the tubes in the set revealed that the 12AU7 (Item V8) AGC Keying and Horizontal Sync Separator was bad. Replaced 12AU7 and picture then was very good using the outside antenna.

George C. Kushner
Duke's Radio & TV Sales & Service
Glassport, Pa.

GENERAL ELECTRIC Model 17C107
Photofact Set 141, Folder 6

Complaint: Picture would fade shortly after the set became operative.

Analysis: It was noticed that some of the tube filaments were bright and others quite dim. (Set employs series filament hookup.) It was also noted when set was turned on that a 60 cycle hum appeared in the picture. The trouble was traced to the 6AU6 (Item V8) 1st Sound IF Amplifier. This tube had developed heater to cathode leakage.

Remedy: Replace 6AU6.

Frank Albert
Radio & Television Service
10702 E. Shore Lane
Philadelphia, Pa.

PHILCO MODELS using 1B3 and 1X2 or two 1X2 high voltage rectifiers

Complaint: Blooming effect on picture when contrast or brightness control advanced.

Analysis and Repair: Change in value of the two 2 meg. or 2.5 meg. resistors connected from heater of first rectifier to plate of booster rectifier. Replacing resistors with IRC type DCH proves highly effective.

G. M. Carrier
Carrier & Sons
811 - 18th St.
Bedford, Indiana

RECORDIO Models 8J10, 8J50
Photofact Set 62, Folder 17

Complaint: Set was dead. Replaced burned out power transformer. Set played for a few days and again went dead.

Analysis and Repair: Checked the set completely and found capacitor C6 (.01MFD, 400 Volts) shorted. Replaced capacitor. Set still has an annoying hiss. Replacing the neon indicator cleared up the trouble.

R. F. Johnson
Arjay Radio Service
Springfield, Ill.

PHILCO Model 49-1150
Photofact Set 92, Folder 5

Complaint: Picture was compressed at bottom.

Analysis and Repair: Found R125, horizontal output cathode resistor, shorted. Replaced with good unit.

Earl W. Lambert
750 - 95th Street
Niagara Falls, N. Y.

PHILCO Model 50-T1600 (Code 122)
Photofact Set 110, Folder 10

Complaint: No brightness.

Analysis and Repair: Tubes were all checked and found to be O.K. Chassis was removed. A voltage checked revealed low voltage on screen of 6BQ6. Other voltages checked O.K. C3, 40MFD filter capacitor, was open. Replaced with new unit.

Irving Rothstein
Rothstein & Smith
Radio & TV Sales & Service
33 No. Main Street
Liberty, New York

MOTOROLA Models 16F1, 16K2, 16T1
Photofact Set 102, Folder 8

Complaint: Vertical roll. Intermittent.

Analysis and Repair: After considerable checking noted that high voltage lead came through top of the chassis near the vertical output transformer. It was found that it would arc over to the transformer frame. High voltage tape on lead and frame cured this.

R. Cutler Low
Sound & Sight Shop
44 Elm Street
Milford, N. H.

TELE KING Model 612
Photofact Set 88, Folder 12

Complaint: No raster.

Analysis and Repair: No high voltage. The capacitor (Item C76) .05MFD in horizontal output screen shorted. This short caused change in value of resistor (Item R98) 8200 ohms. Resistance was changed to 300 ohms. Replaced both parts with listed replacements.

E. Slaski
TV & Radio Repair Service
128 Manning Avenue
Jersey City, N. J.

ADMIRAL Chassis 21F1, 21G1,
21K1, 21L1, 21P1, 21Q1
Photofact Set 135, Folder 2

Complaint: Set had white dots running through picture and picture jumped up and down slightly.

Analysis and Repair: Trouble was found to be defective vertical output transformer. Replaced with good unit.

Victor J. Furst, Jr.
102 N. Symington Avenue
Catonsville, Md.

ADMIRAL Model 17K2
Photofact Set 135, Folder 2

Analysis and Repair: No high voltage. Further examination found R87, 6800 ohm resistor, in horizontal output screen circuit burned out. No other shorts or opens indicated so resistor replaced with new unit. Set operated normally and was replaced in cabinet. Symptom immediately returned and replacement resistor found to be burned out.

Several burned out resistors later it was found that the cause was an intermittent, internal cold filament connection in the 6W4 damper tube.

Remedy: Replace 6W4.

V. J. Terranova
246 St. Mary's Avenue
Staten Island 5, New York

ZENITH Model H2445R (Ch. 24H21)
Photofact Set 120, Folder 13

Complaint: No picture (raster). Sound Normal.

Analysis and Repair: Checked by substitution the tubes in horizontal output section. Noted horizontal output transformer was quite hot. Replaced horizontal output transformer and set was back to normal.

OLYMPIC Model XL612
Photofact Set 109, Folder 8

Complaint: No Sound, Normal picture.

Analysis and Repair: Found C39, capacitor in audio output section, shorted. Replacement of capacitor with new unit restored set to normal operation.

Editors Note: Both above field experiences contributed by:

Fred Levitt
Fred's TV Service
119-53 - 230th St.
Cambria Heights
Jamaica, New York

RCA VICTOR Chassis KCS47A
Photofact Set 113, Folder 7

The chassis had been removed and connected with extension cables. Trouble shooting and repair completed in the customer's home. When the chassis was replaced in the cabinet, the set was completely dead. The filaments were lit, but no B+. When the chassis was removed and reconnected with extension cables it operated normally. The trouble was a poor connection in the jumper between pins 6 and 7 of the octal plug which connects the yoke. This jumper is in series between the rectifier cathode and the input filter. A hot soldering iron applied to both pins cleared up the trouble. No difficulty was experienced with the chassis out as the extension cable had a jumper in the plug instead of leads connecting to pins 6 and 7 of the yoke plug.

Lawrence J. Smith
11 Beal Street
Stamford, Conn.

BOOK REVIEW

Techniques of Television Production
by Rudy Bretz

McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York 36, New York
480 pages - 10.00

This book describes the equipment and materials used in production of television programs. It covers such things as cameras, microphones, switching equipment, graphic materials, scenery, makeup and lighting. Along with the detailed descriptions is advice on the extent and application of each.

The studio technician will find information to help him solve the problems of lighting, camera useage and production planning both for studio and field work. The approach is one of rather informal, non-technical style and should be of interest primarily to production personnel.

The PHOTOFACT Servicer

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FEDERAL'S SELENIUM RECTIFIER HANDBOOK

The design, application, specification and circuitry of selenium rectifiers are described in comprehensive fashion in the second edition of Federal's Selenium Rectifier Handbook, published by the Federal Telephone and Radio Company, Clifton, New Jersey, a division of the International Telephone and Telegraph Corporation.

This enlarged edition of 80 pages treats in detail a representative listing of the selenium rectifiers manufactured by Federal for radio and television use. It also covers rectifier designs and power supply circuits for such applications as phonographs, audio amplifiers, amateur radios, mobile radios, photocell amplifiers, intercommunication systems and other DC power supply requirements.

In addition, servicing information for the selenium rectifier is presented in simple, easy to follow form. Trouble-Shooting tables help the serviceman or technician follow proper procedures in checking a rectifier when specific circuit conditions exist, and diagrams are provided for setting up forward and reverse current tests in the repair shop.

The handbook is sectionalized for quick reference, with three major divisions of technical material.

Federal's Selenium Rectifier Handbook is available through any Federal distributor, or on direct order from the Federal Telephone and Radio Company, 100 Kingsland Road, Clifton, New Jersey. The price is fifty cents (50c).

FACTORY SERVICE HINTS

The following service hints covering Stromberg-Carlson receivers are brought to you through the courtesy of Stromberg-Carlson Co.

Model 317 Series
Photofact Set 146, Folder 10
Model 417 Series
Photofact Set 178, Folder 15

Symptom: Intermittent horizontal picture jitters or wavering.

Possible Causes: 1. Defective 220KΩ resistor (R103-317 Series) (R98-417 Series) from pin 1 of the 6SN7 horizontal Multivibrator tube. If this resistor proves defective it is suggested that a 180KΩ resistor be used as a replacement.

2. Leaky input filter capacitor, from pin 8 of 5U4G rectifier tube. Item C1A.

3. 1500Ω cathode resistor (R101-317 Series) (R96-417 Series) from pin 3 of Horizontal Multivibrator tube off tolerance.

4. Leakage in Horizontal Output Transformer.

5. Defective 1N65 crystal, M7 (317 Series).

Model TC-19
Photofact Set 97, Folder 17

Symptom: Horizontal picture pulling or kinking.

Possible Causes: 1. Some cases of picture pulling in the TC-19 Series receivers have been traced to a changing in value of resistor R65 (Pin 6 of 6AU6 AGC Amp.).

2. Inserting a 100KΩ resistor from the center arm of the Brightness Control in series with the cathode (yellow) lead of the picture tube is helpful in reducing a condition of picture pulling encountered when the brightness control is advanced.

Model 521 Series
Photofact Set 224, Folder 14

Symptom: Vertical Packing.

The following circuit revisions may be made in the 521 Series receivers to correct vertical packing at the top of the raster.

1. Replace resistor R81, 4.7KΩ, 1/2 watt, with a 6.8KΩ, 1/2 watt resistor.

2. Replace resistor R79, 1.8Meg., 1/2 watt, with a 1 Meg., 1/2 watt resistor.

3. Replace capacitor C68, .033MFD, 600 volts, with a .047MFD, 600 volt capacitor.

Late Production: 1. Power transformer, Stromberg-Carlson Part No. 161442, is used on chassis date-coded 10-534 or later. It is virtually the same as Part No. 161443 except that No. 161443 delivers slightly higher secondary voltage.

2. A few vertical output transformers used in production of the 521 Series receivers had the center tap and B+ lead colors reversed. Normally the B+ lead is red and the center tap lead is green.

Model 521 Series
Photofact Set 224, Folder 14
Model 421 Series
Photofact Set 198, Folder 14

Symptom: Barkhausen Oscillation.

Possible Causes: Barkhausen oscillation usually causes one or more vertical black lines to appear on the left side of the picture tube. It can generally be cleared up by adjustment of the Horizontal Drive Control or replacement of the Horizontal Output Tube, 6BQ6GT. The cause of a few cases of apparent barkhausen oscillation has been traced to a defective plate cap connection on the HV Rectifier tube, 1B3GT.

Symptom: High AGC Voltage.

Possible Cause: Extremely high AGC voltage may be traced to an open 1 Meg. resistor between the control grid and the screen grid of the AGC Keying tube, 6AU6.

The following service hints covering DuMont receivers are brought to you through the courtesy of Allen B. DuMont Laboratories, Inc.

Models: All using UHF tuners.

Symptom: UHF tuner inoperative. An inspection of the oscillator components reveals that the 470Ω, 1/2 W resistor in the B+ oscillator circuit, is charred.

Probable Fault: The 6J6 oscillator tube is defective, or the oscillator tuning capacitor plates are shorting together at one position of the tuning range. Either condition will short the oscillator plate voltage to ground.

Models: All using VHF tuner.
89 012 971.

Symptom: Low tuner gain, especially on the higher frequency channels. Proper gain is obtained when the 6BQ7 RF amplifier tube is loosely seated in its socket.

Probable Fault: The 3 MMF feedback capacitor in the input RF amplifier triode circuit (Pin 1 of 6BQ7) is leaky under operation.

Models: All using a UHF tuner

Symptom: UHF pictures are weak and snowy. Receiver sensitivity normal for VHF reception but weak on UHF.

Probable Fault: The harmonic generator crystal, the mixer crystal, and/or the 6J6 frequency oscillator, are defective.

Remedy: Check the 6J6 and the crystals by substitution. Try several crystals and tubes and select the ones that give the best performance.

Models: All using UHF Tuners

Symptom: UHF tuner inoperative, or pictures are extremely noisy.

Probable Fault: One or both of the UHF tuner antenna input loops connecting from the terminal board, to the inside of the tuner are shorting to the tuner case as they enter the tuner.

Models RA166/RA171
Photofact Set 216, Folder 2

Symptom: Poor vertical sync stability. The adjustment of the vertical hold control is critical. The picture does not remain locked in sync over the entire range of the horizontal hold control.

Probable Fault: C82, the .02MFD 200 volt capacitor connected between pin 2 of the 2nd sync clipper, V17, and ground is open.

Symptom: Poor vertical sync stability. The adjustment of the vertical hold control is critical, while the horizontal hold control action is normal. The picture interlace is extremely poor at high contrast control settings.

Probable Fault: R97, the 47K resistor connected between pins 3 and 8 of V16, is open.

Symptom: Severe white compression overload accompanied by a loud buzz in the sound. The AGC and vertical hold control adjustments are critical. Noise and snow are not visible in the raster when the antenna is removed from the receiver input terminals.

Probable Fault: C43 and/or C46, the 680MFD screen bypass capacitors in the first and second video IF amplifiers, are leaky or shorted.

Symptom: Unstable horizontal hold. Resetting the range of the horizontal hold control, by shorting the AFC point to ground, and adjusting the stabilizer coil for a picture that momentarily holds sync, results in the complete loss of horizontal hold when the AFC test point is removed from ground.

Probable Fault: (C84, R107), the vertical integrator network, is defective.

Symptom: Overloaded picture. AGC and contrast controls have only slight affect on the picture. The brightness control operates backwards -- minimum brightness is obtained when the control is rotated fully clockwise.

Probable Fault: L32, the blue peaking coil in the plate circuit of the video amplifier is open.

Symptom: Insufficient horizontal and vertical size. Readjusting the vertical size and linearity controls will give the correct vertical size, but the controls are close to their maximum size adjustments. The horizontal size remains too narrow regardless of the setting of the horizontal size and linearity coils.

Probable Fault: One of the 5Y3 power rectifiers is defective.

Model RA-112, 113
Photofact Set 119, Folder 5

Symptom: 5U4, power rectifier, becomes red hot after five minutes of operation. Picture and raster disappear. Pungent odor without smoke.

Probable Fault: R112, bias resistor, shorts to its cover.

Models RA-164, 165
Photofact Set 189, Folder 7
Models RA166/RA171
Photofact Set 216, Folder 7

Sumptom: Rhythmical appearance and disappearance of heavy picture noise.

Probable Fault: Defective RF or IF amplifier tube.

Symptom: Insufficient brightness. Contrast control functions properly but brightness control does not give sufficient intensity, causing pictures to appear dark. The high-voltage and the focus are normal.

Probable Fault: The 0.1MFD, 200 volt capacitor, in the Picture Tube return trace blanking circuit is leaky. The item number of the capacitor is C58 in the RA-166/171 and C31 in the RA-164/165.

Symptom: Loss of picture brightness. The horizontal hold control affects the horizontal size. In severe cases it also causes a drive line to appear in the picture.

Probable Fault: The 8.2K, 5% resistor, in the horizontal oscillator circuit, has changed value. This resistor is R124 in the RA-166/171, and R97 in the RA-164/165.

The PHOTOFACT Servicer

Vol. 23, Nos. 229 & 230 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ December 15, 1953

PHOTOFACT TV FOLDERS

Tube Placement Chart, Top View

To add to the value of the Tube Placement Chart, Top View in Television Photofact Folders we will be indicating Sound IF and Sync take-off points. Broken lines will be shown from the last tube or stage through which these signals pass in the video section to their respective first stages. (Such as 1st Sound IF or Sync Separator.) This should be of assistance when checking tubes by substitution for cure of indicated symptom. See Figure 1 for example of how the take-off points are to be indicated.

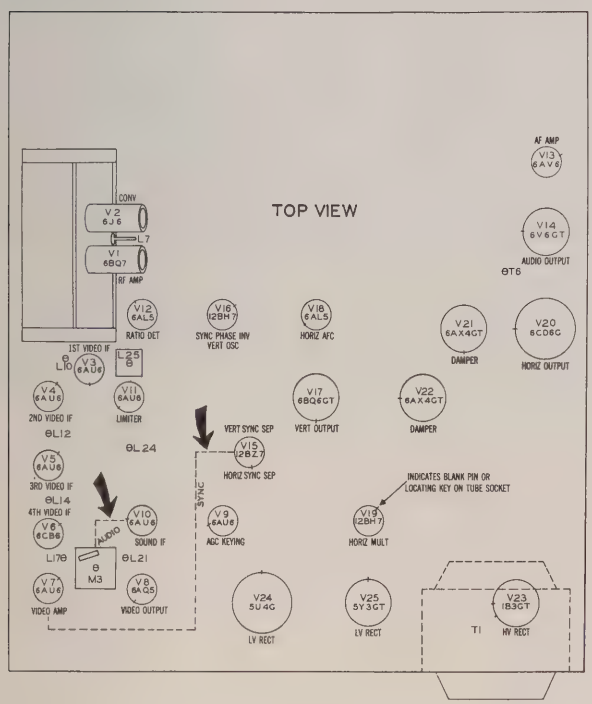


Figure 1

VOLTAGE MEASUREMENTS

Early in 1953 we sent out a questionnaire on test equipment entitled "Help Us To Help You". You replied by the thousands, and your answers were tabulated and studied.

Here is just on example:

What instrument do you prefer when making voltage and resistance measurements Your choice, by over 4 to 1, was the vacuum-tube voltmeter.

Here is just one result:

Commencing with some folders in Set 230, and eventually to be incorporated in all future Photofact folders, DC voltage readings shown on Photofact schematics will be obtained by using a vacuum-tube voltmeter. Any measurements not made with a vacuum-tube voltmeter will be clearly indicated.

It will still be possible to troubleshoot a receiver using the VTVM readings given in the Photofact schematic and a 20,000Ω per volt meter since in most circuits, comparitive readings, within nominal tolerance, will be obtained.

NEW PARTICIPANTS

We are pleased to announce that Halldorson Transformer Company power transformers, audio transformers, filter choke and sweep component replacement parts will be listed in Photofact folders starting with Photofact Set 231.

We are also pleased to announce that Sylvania Electric Products, Inc. crystal diode replacements will be listed in future Photofact Folders.

RCA Victor Automatic Record Changer
RP-190 Series
Photofact Set 144, Folder 7

Additional information on the variations between Models.

Models RP-190-1 and RP-190-1a

Uses crystal pickup Part No. 75476 or 76318 (use No. 74067 for replacement).

Models RP-190-2 and RP-190-2a

Uses crystal pickup Part No. 75575.

Models RP-190-3 and RP-190-3a

Uses crystal pickup Part No. 75476 or 76318 (use No. 74067 for replacement) also has special type motor (85 volts).

Models RP-190-4 and RP-190-4a

Uses different On-Off Switch otherwise same as RP-190-1 and RP-190-1a).

Model RP-190-5

Uses ceramic pickup Part No. 762967, different counterbalance spring and motor suitable for 50 cycle conversion. Otherwise same as RP-190-4a.

Model RP-190-6

Uses crystal pickup Part No. 74067. Otherwise same as RP-190-4a.

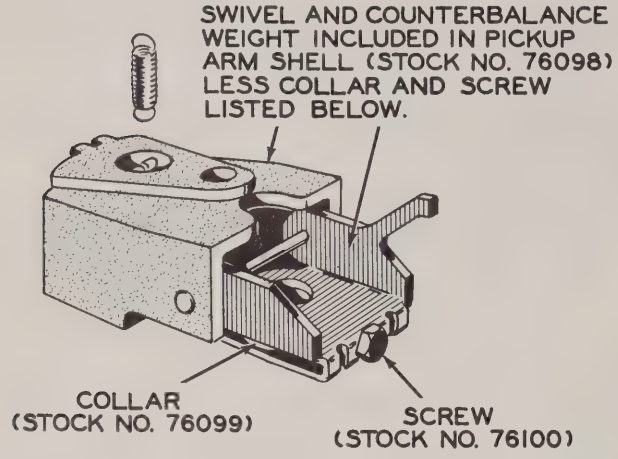
Model RP-190A-1

Does not use On-Off Switch. Otherwise same as RP-190-2a.

Model RP-190A-2

Five parts differ in color only. Otherwise same as RP-190-1a.

Two types of cycling slides and counterbalance assemblies have been used. The "a" in the Model Number indicates the use of the late type assemblies. See Figure 2 for details of late type assemblies.


SWIVEL AND COUNTERBALANCE WEIGHT INCLUDED IN PICKUP ARM SHELL (STOCK NO. 76098) LESS COLLAR AND SCREW LISTED BELOW.
COLLAR (STOCK NO. 76099)
SCREW (STOCK NO. 76100)

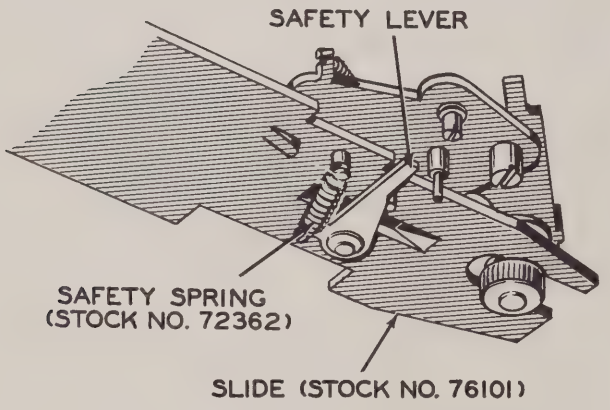


Figure 2

FACTORY SERVICE HINTS

The following service hints covering Admiral television receivers and record changers are brought to you through the courtesy of Admiral Corporation.

Improving UHF Performance of 82 Channel Tuner Receivers-

Poor performance of all channel receivers on UHF may be caused by the UHF antenna lead from the UHF antenna terminals to the UHF tuner being close to or touching the metal brackets of the rear picture tube mount. This lead is purposely long and acts as a quarter wave trap at the mean frequency of the lower VHF channels and a three quarter wave trap at the mean frequency of the higher VHF channels.

Remove the back cover of the cabinet and check this lead to be sure it is not close to any metal and straighten it out if it is looped or doubled up. While the back is off the cabinet and after the antenna lead has been checked, check the lead from UHF antenna terminals at the point where it is soldered to the side of the UHF tuner. Remove the metal bracket (if used) that covers the UHF antenna connections. This bracket was used on the production line and is not required after the set is installed in the cabinet.

Record Changer Model RC600 Photofact Set 218, Folder 2

To prevent any possibility of the centerpost or other parts becoming damaged if records become jammed on the centerpost, two major improvements have been incorporated in the RC600 Record Changer at RUN 2.

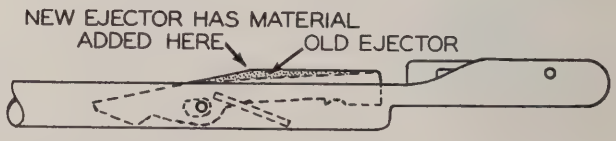
Centerposts Improved-

The G400B601 Centerpost (5), has been improved by increasing the dimensions of the narrowest section of the ejector, the part that pushes the records off the centerpost, and by using a harder steel for this part.

All RC600 changers stamped RUN 2 or higher have the improved centerposts and some late production changers stamped RUN 1 also have the new centerposts.

There is no change in part number between the new and old centerposts, and they are directly interchangeable.

It is difficult to differentiate between the old and new centerposts without making a direct visual comparison. Below is a drawing that illustrates the slight difference in outward appearance.



G400B601 CENTERPOST

Push-Off Lever Improved-

All RC600 changers stamped RUN 2 or higher use a spring loaded Push-Off Lever (115), G400A632. This change was made to prevent the ejector from bending should the records become jammed on the centerpost. The new G400A632 Push-Off Lever and Stud Assembly is directly interchangeable with the G400A603 assembly previously used.

NOTE: The parts involved in the RUN 2 production changes are directly interchangeable with the original parts. In this case, the run number was changed to facilitate identification of the improved changers.

The PHOTOFACT Servicer

Vol. 23. Nos. 227 & 228 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ December 1, 1953

NEW PARTICIPANT

We are pleased to announce that starting with Set 229, Picture tubes and receiving tubes of the Westinghouse Electric Corporation will be listed in Photofact folders.

FACTORY SERVICE HINTS

The following service hints covering Radio Craftsmen receivers are brought to you through the courtesy of the Radio Craftsmen Incorporated, 4401 N. Ravenswood Avenue, Chicago, Illinois.

Model 202
Photofact Set 184, Folder 13

Model 202 TV receivers bearing serial numbers above 4700, include the following changes which should be made in earlier models.

Problem No. 1: Wavy vertical lines and a "twitching" at the top of picture.

Change the grid resistor R108 of the 12AU7 horizontal hold circuit from 100K to 150K 1/2 Watt. At the same time move the resistor to the terminal strip near the back of the chassis, so that it connects directly to the junction of C85/C86, instead of being connected to the horizontal hold potentiometer. Remove the green lead from the tie point near the horizontal hold control and solder it direct to the control.

Turn capacitors C77 and C78, the 1000MMF coupling capacitors between the 12AU7 sync separator and the 6AL5 horizontal sync discriminator, so they lie flat against the chassis.

Remove the green wire between the junction of resistors R99/R100 and the R104/C83 filter network. Disconnect the input of the R104/C83 filter and resistor R101 from the terminal strip lug and swing the resistors and capacitor around so the open ends can be soldered directly to the junction of resistors R99/R100, near the 6AL5.

Remove the 680K resistor R79 (Connected to pins 5 and 6 of the 6BF6) and replace with an 820K 1/2 Watt resistor.

Model 202 receivers bearing serial numbers 2300 and up, have the following changes, which should be added to earlier models.

Problem No. 2: The horizontal hold not stable (does not hold) when switching from channel to channel.

1. Add a 150,000Ω 1/2 Watt resistor from pin 7 (plate) of the 6BF6 to ground.

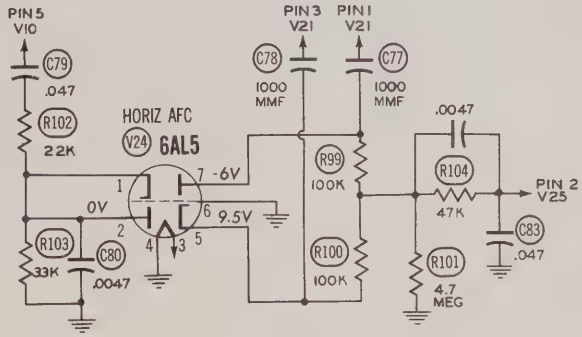
2. Remove R80 (100K) and replace with a 47,000 Ω 1/2 Watt resistor.

Problem No. 3: Tearing of the picture caused by a noise pulse, such as ignition noise.

Replace C67 (0.1MFD) with a 0.47MFD capacitor.

Problem No. 4: Picture elements have jagged outlines.

Change the automatic sync circuit between the 6AL5 horizontal sync discriminator and the 12AU7 horizontal oscillator as indicated below.



The following additional changes should be made on chassis earlier than serial No. 2300, when the very latest circuit is desired.

Change	R40	from 15K	to	6.8K
Change	R78	from 4.7Meg	to	6.8Meg
Change	C67	from 0.1MFD	to	0.47MFD
Change	R106	from 8.2K	to	5.6K
Remove	R49	33K 1W		

The capacitor and resistor values and the circuit suggested above have been used in all Craftsmen 202 chassis later than serial number 2300.

Craftsmen TV chassis, especially Model 202, are made as sensitive as possible in order to meet the requirements of owners in all areas.

Receivers operating in unusually strong signal areas are sometimes overloaded and a buzz or hum is heard in the speaker. To eliminate the buzz on models equipped with the "turret" type tuner, especially the "Cascode" tuner, add a 15,000Ω, 1/2 Watt resistor from the "RF test point" to ground.

When making this circuit change, also be sure the resistor from pin 7 (plate) of the 6BF6 (V20) to

ground is 150,000Ω 1/2 Watt, and that R80 has a value of 47,000Ω 1/2 Watt.

Model RC101
Photofact Set 142, Folder 10
Model RC200
Photofact Set 140, Folder 9
& Prod. Chg. Bul. 40 -- Set 172-1
Model RC201
Photofact Set 151, Folder 10

Retrace lines can be removed from the above models by feeding a vertical blanking pulse to the picture tube.

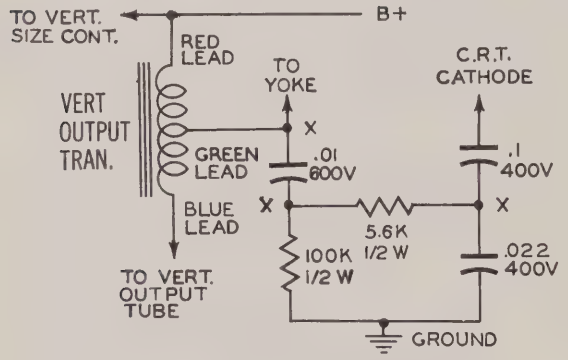
1. Install a 5-point terminal strip to be used in mounting the required parts. A suggested position is between the two parallel terminal strips beside the tuner section and the bracket for the tuning eye.

2. Connect a .01MFD 600 Volt capacitor between the green lead of the vertical output transformer and one of the tie points on the new terminal strip. Connect a 100K 1/2 Watt resistor from this same tie to ground.

3. Connect a 5.6K 1/2 Watt resistor from the same tie point to another blank tie point. Connect a .022MFD 400 Volt capacitor from this second tie point to ground.

4. Connect a .1MFD 400 Volt capacitor between the junction of the 5.6K resistor and the .022 condenser, and the cathode of the picture tube.

Use the extra blank tie points to anchor the new parts. Suggested tie point connections are indicated on the circuit by an "X".



Electrostatic focus picture tubes require 500 Volts DC at pin 6. The lead supplying this voltage is connected to pin 8 of the octal plug at the chassis end of the cable connecting the CRT socket to the chassis.

Some Craftsmen chassis, including Model 202, have this lead, which is blue in color, and the required voltage. They can easily be added to any chassis not so equipped.

Some chassis have the extra lead in the connecting cable but have only 320 Volts DC connected to pin 8 under the chassis. The wiring must be changed to provide the required 500 Volts.

To make the adaptation:

1. Add a lead to the cable between pin 8 of the plug and pin 6 of the CRT socket, if needed.

2. Check the presence of 500 Volts DC at pin 8 of the octal socket at the rear of the chassis. If a lower voltage is found:

(a) Remove the wires tied to terminal 8. It is used as a "tie point" in those chassis not wired for use with electrostatic tubes. Carefully resolder the leads together and tape them or remove the ground from pin 4 and use it as a tie point.

(b) Add a lead to provide 500 Volts, as suggested below.

In Models RC-100 and RC-100A, 500 Volts is available from terminal #1 of the high voltage transformer, the point that connects to the 6W4GT damper tube through the linearity coil.

In earlier models RC-101 and RC-200, the 500 Volts is available from terminal #3, the terminal connected to the 6W4GT plate through .022 capacitor.

In later models RC-101 and RC-200, plus all RC-201, terminal #4 of the high voltage transformer will deliver the required voltage.

IN ALL CASES the high voltage take-off point should be made from a convenient tie point underneath the chassis, rather than from the suggested terminal of the transformer itself. When a variable voltage is desired, to control the focus, add a 5 Meg Ω potentiometer from the 500 Volt take-off point to ground and connect the arm of the pot to pin 8 of the octal socket.

When changing to an electrostatic focus tube, remove the magnetic focalizer from the back of the deflection yoke. Use a 16X408 centering magnet in its place. The ion trap remains the same and is used in the same position.

Automatic or fixed focus electrostatic tubes are available which contain an internal connection to the focus anode. No external lead is necessary. However no control over the focus is possible. Examples of such tubes are the 17KP4 and 17RP4.

Model 800
Photofact Set 204, Folder 8

Revisions for increased FM sensitivity.

When making these changes, the third IF will have to be rephased and the limiters should be checked.

Change	C8	from 150MMF	to	47MMF
Change	C7	from 220MMF	to	150MMF
Change	C6	from 10MMF	to	15MMF
Change	L2	from 3.3 Microhenries	to	4.7 Microhenries
Change	R34	from 33 KΩ		10KΩ
Change	R33	from 15KΩ, 1W	to	47KΩ, 1W
Change	R36	from 10KΩ	to	1KΩ
Remove	R7	1.5KΩ		

Add a 1K, 1/2 W resistor between pin 6 of the 6CB6 and the junction of L2 and R6.

Add a 150MMF capacitor from the junction of L2 and R6 to ground.

Model 800 tuners with serial numbers near 35900 and over already have these changes incorporated in them.

It is recommended that these revisions be made on all 800's where the FM sensitivity is deficient.

The PHOTOFACT Servicer

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CHANGE IN PHOTOFACT TV FOLDERS

Photo-Chassis Top View

To make this photograph more useable in locating other parts and alignment adjustments, call-outs of tubes will be omitted on this photograph in future Photofact TV folders. Refer to the Tube Placement Chart, Top View, for location, type and function of the tubes.

BOOK REVIEW

Standard Handbook For Electrical Engineers
8th Edition
Edited by Archer E. Knowlton

McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York 36, New York
2311 pages - $17.00

Mr. Knowlton, Senior Associate Editor of Electrical World, has successfully compiled material from 102 individual contributors who are recognized authorities in the electrical and electronics field. In 26 sections, information is given on definitions, conversion factors, physical and mathematical principles, formulas, AC and DC equipment of all types, power systems, welding, electronics, communications and many other phases.

This standard reference, edited for the 8th time since 1907, is a valuable tool providing up-to-date information for any technician not only on current standards, but also on designs and commercial practices.

FACTORY SERVICE HINT

The following information is brought to you through the courtesy of the Admiral Corporation.

ADMIRAL RECORD CHANGER
Model RC600
Photofact Set 218, Folder 2

REMOVING TURNTABLE

1. Remove the changer from its cabinet or compartment whenever it becomes necessary to remove the turntable.

2. Be certain the changer is out of cycle. The turntable cannot be removed without damaging the mechanism if the cycle mechanism is engaged.

3. Remove the retainer clip at the top of turntable by pulling it sideways with small screwdriver.

4. Place the changer on its front edge and tilt it out enough so the turntable will loosen on the centerpost as you rotate it by hand. It should come away from changer pan without falling completely off. If necessary, move the motor idler wheel slide away from the turntable rim to release the idler wheel. Do this from underneath the changer.

5. The turntable will slide down the centerpost and away from the changer pan. When removing the turntable from the centerpost, be careful that the thrust washer doesn't fall off and become lost.

6. When replacing the turntable, be sure to move the motor idler wheel slide from underneath the changer so the idler wheel will be toward the centerpost. This will permit engaging the idler wheel with the rim of the turntable. Do not touch the rubber tire on idler wheel with your fingers or attempt to pry the wheel with any tools. Always move the idler wheel by moving the slide.

TURNTABLE REPLACEMENT

Nearly all RC600 Record Changer turntables, part number G400B602, that are replaced, are replaced because the turntable hub gear becomes "chewed-up" or "stripped".

The turntable hub gear is practically never defective in itself, but results from other faulty, damaged, or incorrectly assembled parts.

Most frequently, the turntable hub gear becomes damaged when it does not mesh properly with the drive gear (19) because one or more of the following parts may be dimensionally out of tolerance or damaged:

Trip Motion Arm (17)
Gear Engagement Pawl (15)
Trip Pivot Hub (18)

If the distance between the axis of the gear engagement pawl (15) and the end of the pawl that engages the lug on the turntable hub is incorrect for any reason, the drive gear (19) will not mesh properly with the turntable hub gear, and the turntable hub gear will become damaged.

It is difficult to visually determine any fault with the trip assembly parts. For this reason, and in the interest of preventing service "call-backs", always replace the trip motion arm (17), gear engagement pawl (15), and trip pivot hub (18) when replacing the turntable. The following kit of parts will be packed

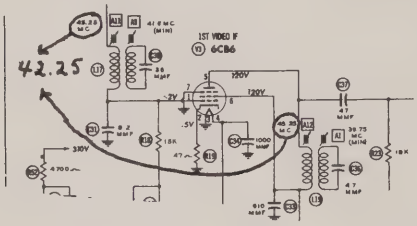
with every service replacement G400B602 turntable for the RC600 Record Changer:

Part Number	Description
401A351-1	Trip Motion Arm (17)
401A352	Gear Engagement Pawl (15)
402A292	Trip Pivot Hub (18)
412A36	Fibre Washer (16)
401A366	Trip Friction Washer (14)
4B2-178-0	Flat Washer (13)
401A355-1	Retaining Ring (12)

CORRECTION NOTES

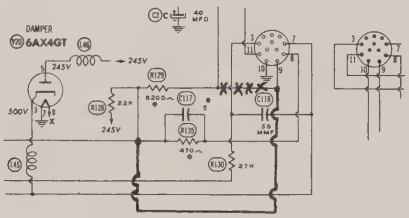
ARVIN Model 6175TM, 6179TM
(Chassis TE-331, TE-331-2)
Photofact Set 181, Folder 4

Schematic - Correct alignment frequencies of A11 and A12 as shown below.



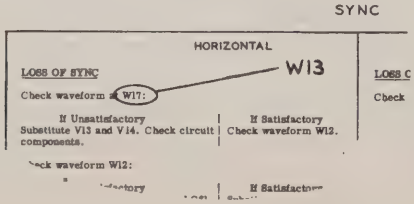
PHILCO Models 53-T1853, L, 53-T2127,
53-T2266, 53-T2268, 53-T2269
53-T2270, 53-T2271, 53-T2273C, M
(Code 126) (Ch. J-1, 91)
Photofact Set 185, Folder 10

Schematic - Make correction as shown below.



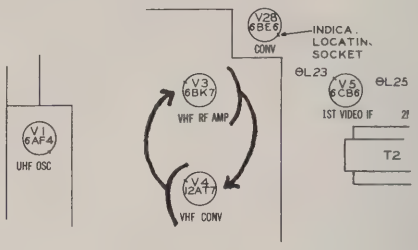
ADMIRAL Chassis 22C2, 22E2
Photofact Set 201, Folder 2

Trouble Shooting Aids - Page 12 correct as shown below.



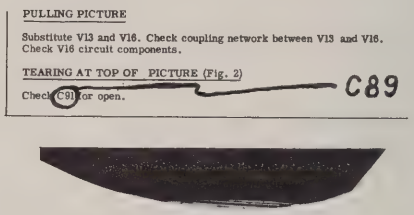
RAYTHEON Models C-2112A, C-2113A,
C-2114A, C-2115A, C-2116A, C-2118A,
RC-2117A (Ch. 21T3)
Photofact Set 202, Folder 7

Tube Placement Charts - Pages 5 and 8 Transpose V3 and V4 as shown below.



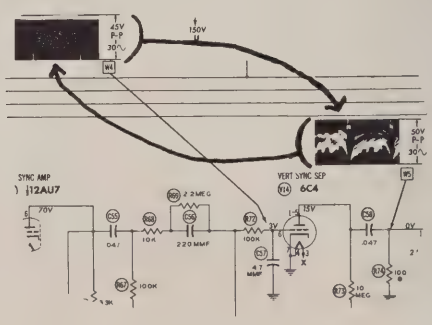
CAPEHART Chassis CT-75, CT-77,
CT-81 (CX-37 Series)
Photofact Set 203, Folder 4

Trouble Shooting Aids - Page 12 correct as shown below.


PULLING PICTURE
Substitute V13 and V16. Check coupling network between V13 and V16.
Check V16 circuit components.
TEARING AT TOP OF PICTURE (Fig. 2)
Check C89 for open.
C89

EMERSON Models 711F, 712F, 720D,
F, 732B, 733F, 734B, 742B
(Ch. 1201698, D, F)

Schematic Diagram - Transpose waveforms W4 and W5 as shown below.



COMING IN JANUARY:
the New Better-Than-Ever Monthly PF INDEX!

Beginning in January 1954, our new magazine will make its appearance regularly EACH MONTH.

The new Publication will be truly the monthly Magazine of the Electronic Service Industry. The monthly schedule will now make possible the widest editorial coverage of new developments and latest servicing knowledge you've asked for.

We mean to make the new monthly PF INDEX more valuable to you than ever. For example, the January issue will feature the first comprehensive story on COLOR TV from the special viewpoint of its potential significance to you. This feature will be in addition to dozens of other invaluable articles on vital aspects of everyday servicing, and orientation on new circuit developments, equipment and techniques. Regular features, such as "Shop Talk," "In the Interest of Quicker Servicing," "Dollar and Sense Servicing," "UHF," and "Examining Design Features," will be retained.

IMPORTANT: The new monthly PF INDEX will be available early in January 1954, from your local Parts Distributor, at 25¢ per issue. Each distributor will be allotted only a limited number of copies. To make certain that you will receive your issues, and to help your Distributor determine how many copies he will require each month, we suggest that you fill out the reservation card included in this set of folders and leave it with, or mail it to, your Distributor. This will guarantee your receipt of each monthly issue of the new PF INDEX and avoid disappointment.*

Look for the new monthly PF INDEX starting in January 1954 and out each month thereafter —the Magazine of the Electronic Service Industry —the only publication that brings you the intimate, practical coverage and understanding of the developments, products, applications and techniques you require for success in your daily work.

Howard W. Sams

Many thanks for your support. I know you will continue to be an enthusiastic P. F. INDEX reader

** The response to our announcement of the new monthly* PF INDEX *in our September-October issue indicates a "sell-out" for the new magazine. Act early and make your reservation for the new monthly* INDEX *now.*

The monthly Magazine of the Electronic Service Industry will not be included with sets of Photofact Folders. You will continue to receive the Cumulative Index Section without charge, starting with Photofact Set No. 226.

The PHOTOFACT Servicer

Vol. 27, Nos. 261 & 262 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ October 1, 1954

PHOTOFACT PRODUCTION CHANGE SET NO. A-200

Covering Production Change Bulletins, Nos. 1 Thru 63 Which Have Appeared In PHOTOFACT Folder Sets Thru No. 200

Production changes and modifications are inevitable in Television Receiver production. Every attempt is made to incorporate all known production changes while PHOTOFACT Folders are in the process of compilation and right up to the hour of publication. However, changes may be made in models months after they first appear on the market.

A Set of Production Change Bulletins providing in one package, all Production Change Bulletins released in PHOTOFACT Sets through No. 200, is now available. The changes are presented in convenient and clearly organized form for quick and easy reference. This one inexpensive guide obviates the need for purchasing additional PHOTOFACT Folders for the sole purpose of obtaining production changes made subsequent to the publication of the original Folder. The Guide answers the demand from thousands of Service Technicians for just such an economical, organized source of production change data. Now available at your PHOTOFACT Distributor. Price $1.75.

NOTE: Regular Subscribers who have obtained each Set of PHOTOFACTS through No. 200 already have this data.

FIELD EXPERIENCES

For every "Field Experience" published, we issue a certificate good for one PHOTOFACT Folder Set. Awards are issued at the time of publication. Since it is impossible to verify the accuracy of contributions, we cannot be responsible for either the diagnosis made of the receiver trouble, or the results which will be obtained by following the suggested repair routine. All contributions become the property of Howard W. Sams & Co., Inc.

General Electric Model 17C103
Photofact Set 141, Folder 6

Complaint: Vertical hold was very unstable.

Cause and Remedy: Replacement of two weak tubes (V14 and V15) stopped the rolling of pictures. The vertical multivibrator circuit consists of one section of a 6SN7 (V14) and one section of a 12AU7 (V15). With new tubes in place there now was a foldover at the bottom of the picture on strong noise pulses. Capacitor C86 was found to be leaky and replacement unit completed the repair.

Bendix Model 6001
Photofact Set 111, Folder 3

Complaint: The picture would not sync horizontally. The hold control was not effective.

Cause and Remedy: Checking revealed C46 (connected from Pin 2 of 6SN7 to chassis) was leaky. Replacement of capacitor was the remedy.

Both above Field Experiences were contributed by:

Adolphas Yoder
3315 Hull Ave.
Flint, Michigan

Meck Model JM717C
Photofact Set 148, Folder 11

Complaint: No raster.

Analysis and Repair: Checking revealed no high voltage. Tube substitution eliminates tube trouble. Further checking indicated leakage between horizontal output transformer windings. Replaced transformer and set returned to normal operation.

E. Hidy TV Service
523 Whitcomb Court
Benton Harbor, Michigan

General Electric Model 17C104
Photofact Set 141, Folder 6

Symptom: Picture required approximately 1 hour to fill out mask and was very dim during this period.

Cause: R121, the filament dropping temperature compensating resistor had changed in value. Cold resistance was 1900 ohms instead of 250 ohms.

Remedy: Replace with new temperature compensating resistor.

James A. John
715 9th Avenue, South
Clinton, Iowa

Zenith Chassis 20J21
Photofact Set 159, Folder 18

Complaint: No picture, sound and raster OK.

Cause and Repair: Open crystal detector, 1N64, located in Fourth Video IF transformer. In order to

replace the 1N64 the chassis must be removed from the cabinet. On bottom of chassis remove small shield underneath fine tuning extension shaft coupling. Unsolder thru leads and one end of resistor (R35) and one end of capacitor (C31). Remove two nuts holding transformer to chassis. Transformer can then be removed and crystal replaced.

John M. Sulak
Sulak Radio - Television Service
R. D. 2, Box 242
Willsburg, West Virginia

RCA Victor Model 17T173
Photofact Set 158, Folder 11

Complaint: No raster.

Analysis and Repair: Leak of raster was caused by insufficient high voltage. Width coil was the culprit. A resistance check indicated it was OK but after a short time the coil became extremely hot. Replacement of width coil restored high voltage to normal.

R. D. Randolph
Donaldson Radio and Electric Co.
215 E. 27th Street
Kansas City, Missouri

Philco Model 52-T2252
Photofact Set 179, Folder 9

Complaint: Intermittent raster. Would be OK for several days, then off. Sound OK.

Analysis and Repair: Check revealed high voltage to be present at all times. A resistance reading of the picture tube filament pins indicated they were OK however heating of filament pins and allowing solder to flow into pin holes was the cure.

Philco Model 53-T2124
Photofact Set 201, Folder 7

Complaint: No sound, no raster.

Analysis and Repair: Fuse M3 was blown. A replacement lasted a few hours and also blew. Further checking revealed C1 to be leaky. This is input filter capacitor. Replacing of capacitor and a new fuse restored set to normal operation.

Both the above Field Experiences contributed by:

John Pirre
9 Cottage Street
Stamford, Conn.

FACTORY SERVICE HINTS

The following service hints covering DuMont Television receivers are brought to you through the courtesy of Allen B. DuMont Laboratories, Inc.

Chassis RA-306, RA-307
Photofact Set 241, Folder 6

Symptom: White elements in picture have trailing blacks, and black elements have trailing whites giving appearance of improper video IF alignment.

Probable Fault: R40 (33 ohms, 10%, 1/2 W), the cathode resistor of the video amplifier (V8), has increased in value.

Symptom: Heavy streaking noise in the picture accompanied by slight smear.

Probable Fault: L30, the peaking coil in the grid circuit of the video amplifier (V8) is open.

Symptom: Picture size normal when receiver is turned on. After a few minutes' operation, the picture height and width shrink and the picture no longer fills the mask.

Probable Fault: The 6SN7 (V18) horizontal oscillator tube is defective.

Symptom: UHF signals are received with excessive picture snow. Removing the 6J6 (V3) from the VHF tuner improves the picture by reducing the picture snow.

Probable Fault: C44 (1 MFD, 100 volt), AGC filter capacitor is shorted.

Symptom: Insufficient picture height. Resetting the Vertical Size and Linearity controls gives proper height but linearity is poor. Correct linearity can only be obtained when the picture height is adjusted greatly oversize.

Probable Fault: C2A (10 MFD, 50 volts), the cathode bypass of the vertical amplifier (V16), is open.

Symptom: No sound. Insufficient vertical and horizontal size. The Vertical Hold control adjustment is critical.

Probable Fault: C68 (10000 MMF, 500 volts), the sound IF screen-bypass capacitor, is shorted.

Remedy: Replace C68, R63 (1K, 10%, 1/2 W), the sound IF screen resistor, and R75 (220 ohms, 20%, 2 W), the audio output screen resistor. These resistors are damaged when the receiver is operated with C68 shorted.

Symptom: Picture overload. The AGC control does not clear up the trouble. Fringe signals (simulated in strong signal areas by disconnecting the antenna) are received properly, subject to excessive fading and airplane flutter.

Probable Fault: R57 (39K, 10%, 1/2 W), the resistor feeding the sync pulses from the video amplifier output circuit to the grid of the AGC keyer (pin 1 of V9), has increased in value.

Symptom: Overload on strong and moderate signals. Adjustment of the AGC control (R7) has no effect on the picture.

Probable Fault: C64 (.022 MFD, 10%, 200 volt), AGC filter capacitor, is shorted.

The PHOTOFACT Servicer

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FACTORY SERVICE HINTS

The following service hints covering Crosley Television Receivers are brought to you through the courtesy of Crosley, Division - Avco Manufacturing Corporation.

Crosley Super V TV Receiver
(G - Series Models)
Photofact Set 249, Folder 5
Photofact Set 263, Folder 6

INTERMITTENT INTERLACE, VERTICAL JITTER OR INSTABILITY

Check C38 (249-5) or C37 (263-6), AGC by-pass capacitor. A few instances have been reported where this capacitor has broken loose, resulting in vertical jitter.

In other cases of vertical jitter, the picture may jump up and down at a rapid rate giving the effect of a double picture vertically. This condition can usually be corrected by removing C56 (249-5) or C55 (263-6) from across the plate winding of T1 and connecting a 560 MMF., 10% 500 W. disc ceramic capacitor (Part No. 144675-32) from the vertical oscillator grid (Pin #2) to ground.

For improvement of vertical interlace, several things should be checked. Check and see whether there is a 5000 MMF. disc ceramic capacitor between the rear CRT support and the chassis and whether it is properly connected. This capacitor by-passes stray electrostatic fields which may be affecting the interlace.

Install a deflection yoke shield, Part No. 158644, between the deflection yoke and coil L7 (249-5) or L6 (263-6), if it is not already on the chassis. It can be easily slipped over the edge of the deflection yoke opening and is held in place by means of a spring type clamp. Check the lead dress of the yellow leads from the Brightness and Contrast Controls which run under the yoke. These leads should be dressed against the chassis and away from the yoke, and can easily be tucked under the .25 MFD., 25 V. AGC by-pass capacitor. This capacitor is located below and slightly to the left of the hole opening as you face the chassis from the rear. On late production chassis, these leads are shielded from the yoke by means of a spiral shield. Check that the leads of the horizontal coil of the deflection yoke are dressed away from the vertical output tube.

On chassis with a 6AN8 Video Amplifier and Sync Clipper, further improvement can be made by removing R51 and changing R49 from 2.2 megohm to a 1.0 megohm resistor (263-6). The voltage supply end of the resistor should be connected to Pin 3 of V7A instead of the +150 volt string. At the same time, R51 (680, 000 ohm) should be removed from between +150 volts and the Sync Amplifier grid (Pin #9, 6U8). These circuit changes will also give some improvement of vertical stability.

VERTICAL LINEARITY

Occasionally, individual characteristics of the 12BH7 tube and the vertical output transformer combine in such a way that there is a slight amount of spreading or compression at the top of the picture which is out of the range of the Linearity and Height Controls to correct.

On chassis where the spreading occurs, the effective range of these controls is easily changed by adding a negative peaking circuit, made up a .01 MFD., 600 V., paper capacitor (Part No. 39001-13) in series with a 150,000 ohm, 10% 1 W. resistor (Part No. 39374-139), from plate to ground in the vertical output stage.

On chassis where the compression occurs, the effective range of the Linearity and Height controls is easily changed by adding a 68,000 ohm, 10%, 1/2 W. resistor (Part No. 39374-47) between the grid of the vertical output stage and the junction of C58 (249-5) or (263-6) and T1 (Vertical BTO Transformer). In later production chassis, the resistor is already wired in this position and is provided with a jumper across it which can be clipped off. The added resistance in the circuit affects the input waveshape to the output stage in such a way as to introduce a slight amount of compensating spread.

When either the tube or the transformer is replaced, such methods of "Compensation" may or may not be needed; and in order to obtain proper linearity, it may be necessary to change the effective range of the Linearity and Height Controls. This will mean, in some cases, removing the compensating components previously used; in other cases, it will mean adding some type of compensation — depending upon whether more or less spread (or compression) is needed at the top of the picture.

In another type of nonlinearity, common coupling between sections A and D of C2 can introduce a spike from the B+ into the vertical sweep output circuit, causing a narrow band of compressed lines (about 1/4" in width) to appear in an otherwise normal picture. The compressed lines, caused by the nonlinearity in

the vertical sweep, will show up in some cases as a stationary light or white horizontal streak in either the top or bottom half of the raster. However, on non-synchronous programs, it will travel up and down across the raster in a continuous movement. This condition can be readily corrected in most cases without removing the cabinet by clipping the yellow lead from C2D and installing a new 30 MFD., 150 V. capacitor between the yellow lead and ground. In areas where there is considerable variation in the AC line voltage, an additional advantage can be realized by using an 80 MFD. capacitor. The additional capacity will eliminate the erratic variations in the vertical linearity at the top of the picture which are caused by the fluctuations in line voltage. If a single 80 MFD. capacitor is not handy, a 30/50 MFD, 150 V. capacitor (Part No. 155006) can be used by connecting the two sections in parallel. It can be mounted by using either its own mounting clip or by taping to the 4-section capacitor.

HORIZONTAL PULL

In some cases of horizontal pull, characterized by a traingular notch about halfway down the right side of the raster, the trouble has been diagnosed as core saturation of the horizontal output transformer at high line voltages. This trouble can be easily corrected by increasing the air gap in the core of the transformer by adding one or two pieces of plastic tape between the pole pieces. A paper base plastic tape is desirable, if available. There may be on the core an excess length of tape, the end of which can be turned back to increase the gap. When the tape is applied in more than one layer, fold back one layer at a time. Care should be taken not to make the air gap too wide as it will result in insufficient picture width.

ARC-OVER IN 12BH7 SOCKET

When the Height Control is misadjusted to the extreme end of its range, an abnormally high voltage pulse is present at the output stage. Under these conditions, the 12BH7 tube socket sometimes has a tendency to arc-over between pin #6 (vertical output plate) and pin #5 (filament). To eliminate this possibility of arc-over, the two triode sections of the tube should be reversed, using pins 6, 7, and 8 for the oscillator section, and pins 1, 2, and 3 for the vertical output stage. This change has been instituted on chassis 431-2 (Code A), chassis 431-1 (Code B), and chassis 434 (Code A).

WEAK AUDIO OUTPUT

This may be due in some cases to too great capacity of C49 (249-5) or C48 (263-6). In such cases, replace the capacitor with a .001 MFD., 500V., disc ceramic capacitor. Part No. 158215-17.

TO IMPROVE 1B3GT FILAMENT VOLTAGE REGULATION AND TO PROLONG THE LIFE OF 1B3GT TUBES IN 24" & 27" TELEVISION RECEIVERS (1954 MODELS — F-SERIES)

Photofact Set 228, Folder 6
Photofact Set 234, Folder 5

In 24" and 27" TV chassis, the filament of the 1B3GT tube is normally operated at or near the maximum allowable voltage. In some cases, such as high line voltage, this filament voltage has been found to exceed the rated value, causing a burn-out of the tube filament.

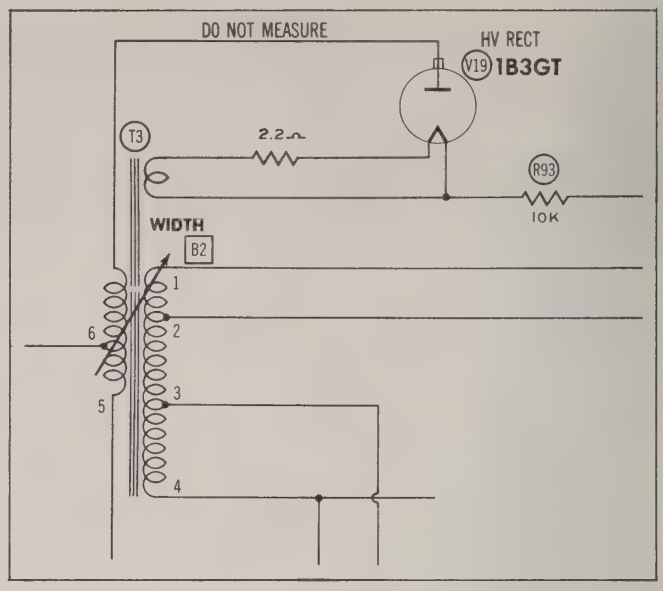

Fig. 1

To provide lower and better regulated voltage and to increase the life of the 1B3GT tube under these conditions, it is suggested that a 2.2 ohm, 10%, 1/2 W. wire-wound resistor (Part No. 39303-12) be inserted in series with the filament as shown in Fig. 1. An easy way to make the change is to remove the wire from pin #2 of the tube socket and connect it to pin #4. Then connect one of the resistor leads to pin #2 and the other lead to pin #4. Resolder both connections.

Since the addition of this resistor increases the life of the tube, it is recommended that it be installed on all receivers of this series that are brought in for service.

PINCUSHION CORRECTION MAGNETS FOR 24" and 27" TELEVISION CHASSIS

If the picture on 24" and 27" television receivers has excessive pincushioning, i.e., tends to curve or bow in on the top or bottom edges, this condition may be caused by the misadjustment of the pincushion magnets which are mounted on the front side of the deflection yoke bracket, one above and one below the tube flare. Adjust the position of the magnets, as described below, to correct the shape of the picture.

If the receiver is not already equipped, the magnets (Part No. 157599) may be added as described below.

MOUNTING THE MAGNETS

The upper magnet may be mounted using the center hole in the flange at the top front of the deflection yoke bracket.

The lower magnet may be mounted by soldering the end of the support strap directly to the Deflection Yoke Bracket. It should be positioned so that the hole in the end of the strap is located on the vertical center line of the Bracket and approximately 1 3/4" below the bottom edge of the large hole provided for the tube neck. An alternate method is to drill a small hole in the Deflection Yoke Bracket at this point and secure the magnet to the bracket using a suitable nut and bolt.

The PHOTOFACT Servicer

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BOOK REVIEW

20 Basic Points for TV Receiver Service
by
A. C. W. Saunders

Lecture Bureau Publishing Company, Inc.
161 Luckie St., Atlanta 3, Georgia

44 Pages - $1.00

Written by one of the leading lecturers on the subject of TV Service, this notebook makes interesting and informative reading. It covers basic considerations in the design of video amplifiers, AGC circuits, IF stages, video detectors and associated TV circuits in language easily understood by the Service technician. Even though the reader has not heard Mr. Saunders speak on the subject, much worthwhile knowledge can be gained in reading this notebook.

* * *

Test Instrument Applications Manual
by
Edward M. Noll

Lecture Bureau Publishing Company, Inc.
161 Luckie St., Atlanta 3, Georgia

48 Pages - $1.00

The author is well-known for his authoritative writing on TV service techniques. This manual presents test equipment in three steps: (1) features and characteristics of Test Equipment and importance in the use of the equipment; (2) familarization with specific pieces, and; (3) examples and procedures for the use of equipment in service work. A straightforward approach to the subject, this manual defines many of the terms and specifications used in describing test equipment.

* * *

Musical Engineering
by
Dr. Harry F. Olson

McGraw - Hill Book Co., Inc.
New York 10, New York

370 Pages - $6.50

Dr. Olson, director of the Accoustical Laboratory of the Radio Corp. of America, has an outstanding record of contributions to field of sound reproduction. In this book, he has applied the engineering viewpoint to the elements of music production and reproduction. All musical instruments are described and classified as to construction, range and characteristics. The theory of music, musical scales, notation and terminology are covered. The properties of sound, the vibrating, resonating and radiating systems of musical instruments are discussed in detail.

Reading this learned discussion the sound enthusiast, the musician, the sound technician will find many informative and interesting facts which will contribute to his enjoyment and working knowledge.

* * *

NEW PRODUCT

The Astatic Corporation, Conneaut, Ohio announces production of a new, low-priced miniature microphone, model 54M3. This is a high output unit and non-directional when mounted in its base. The top grille is a circular metal stamping, one and three quarters inch in diameter and one half inch deep, with gold plate finish. Housing and handle are combined in a single die cast unit, finished in dark chocolate brown baked enamel. A die cast desk base with rubber feet is standard equipment. Furnished with five feet of rubber covered, single conductor shielded cable and protector sleeve at microphone. The model 54M3 is recommended for Recorder, PA, Conference and other uses. Its response (30 to 10,000 cycles per second) is flat to 1000, gradually rising to 6000 cps.

* * *

The following service hints covering Philharmonic Television Receivers are brought to you through the courtesy of Philharmonic Radio and Television Corp., 235 Jersey Ave., New Brunswick, New Jersey.

Models 520, 620, 720, 724, 820, 824,
5820, 6120, 7120, 7820, 8120, 8820
Photofact Set 173, Folder 10

Interference due to 4.5 mc Sound Interaction -

This interference will occasionally occur due to cross modulation products on strong signals. To remove this interference put a .005 mfd. disc capacitor from pin 2 of the 6AU6(V7) to ground, keeping the leads as short as possible.

Vertical Sync -

Where stations are transmitting less than normal sync to video ratio, the vertical sync in this set may tend to be critical. In these sets the following changes are recommended.

1. Replace C57 - 002 mfd. with a .01 mfd.

2. Replace R50 - 3.9K ohm resistor with a 15 K ohm 1 watt.

3. Place a .0047 mfd. capacitor in parallel with R50.

4. Remove the lead from R51 that goes to the 135 volt line and connect to 370 volt line (high side of R79-3.3K ohm).

Ratio Detector -

Two types of detector cans may be used.

The circuit shown is for part No. 10-552 (Standard Coil). If part No. 10-553 (Automatic) is used the circuit is changed as follows.

1. C42 - 5mmf. is removed.

2. R38 - 12K ohm resistor is changed to 27K ohm.

Critical Drive -

With any set that may have its drive control operated near the closed position so that the drive control is critical, replace R70-56K ohm resistor with a 120K ohm.

Excessive Height -

If the set seems to have excessive height, and the controls do not cut this down far enough, replace R56 - 1.5 meg. - 2.7 meg. with a 3.3 meg. resistor.

Picture Tube Operation Under Low Line Voltage -

If the set is going to be operated under low line voltage (under 105 volts) make the following changes: Remove C35 - .02 mfd. 1000 volts capacitor and R33-10K ohm resistor. Connect pin 10 of the picture tube to B+ 370 volts. Connect brown wire of the filament lead of the picture tube socket to one of the empty terminals strips and direct a wire from this point to the green wire of the power transformer, (filament voltage) directly. These changes are necessary to increase the life of the picture tube due to line voltage causing the filament voltage of the picture tube to be lower than the rated voltage allowable.

Black Bars on Side of Raster -

When black bars on the left hand side of raster appear (these are not black bars that appear with the picture, but on raster only), make the following changes:

1. Place a 3.3 ohm resistor in series with C68 and 3.3 ohm resistor, place a wire to the ground side of R59 - 8.2K ohm resistor. Remove the ground connection from R59.

* * *

The following Service Hints covering DuMont Television Receivers, originally published in the DuMont Service News, are brought to you through the courtesy of Allen B. DuMont Laboratories, Inc.

Models RA-160 and RA-162
Photofact Set 179, Folder 4

This change has been suggested for those receivers operating in deep fringe areas. Due to the great drive and gain in these models the background snow has a tendency to be "blobby" and the change mentioned here is to reduce or minimize this effect.

Figure 1 shows the addition of an 8200 ohm resistor to the video detector plate load and the "Hi-Lo" Signal Switch is rewired so this resistor is removed from the circuit in the "Hi" position. The switch wiring is also changed to reduce the AGC voltage applied to the tuner.

The following procedure is suggested in making the necessary changes:

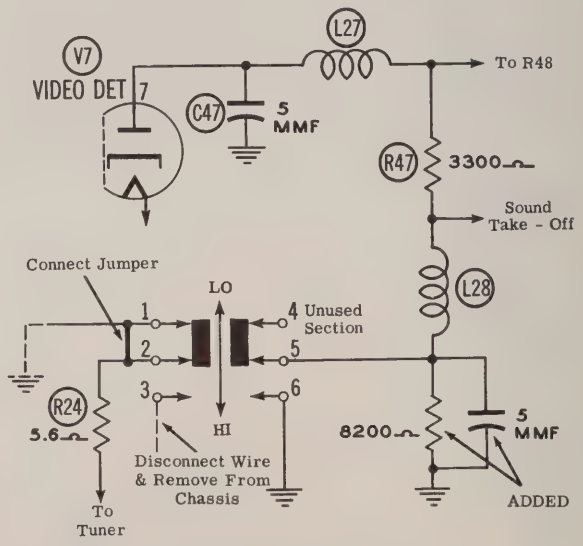
1. Locate the terminal board to which L28 (Video Det. Plate Load Circuit) is connected. If there are two leads connected at the end terminal (Terminal next to the one L28 is connected), remove the leads and join them together, insulating the joint with spaghetti or tape.

2. Disconnect the grounded end of L28 and connect it to the end terminal made available in step 1.

3. Connect a 8200 ohm, 1/2 watt, resistor from this end terminal to the ground lug terminal from which L28 was just removed.

4. Connect a 5 mmf., 50 volt, capacitor across (parallel) the 8200 ohm resistor.

5. Connect a lead from the same end lug of this terminal board to terminal 5 of the "Hi-Lo" Signal Switch as shown in Figure 1. Run this lead close to the chassis keeping it on the side of terminal strips away from the video IF stages. Pass it through the chassis hole between resistors R1



REVISED CIRCUIT

Figure 1.

(Vertical and Horizontal Hold Control) and R2 (Volume and Tone Control).

6. Ground terminal 6 of the "Hi-Lo" Signal Switch as shown in Figure 1.

7. Disconnect both ends of the lead connecting to terminal 3 of3the "Hi-Lo" Switch and remove the lead from the chassis.

8. Connect a jumper between terminals 1 and 2 of the "Hi-Lo" Signal Switch.

* * *

The following service hints covering Arvin Television Receivers are brought to you through the courtesy of Arvin Industries Inc., Radio & Television Division.

Model 3100 Series, Ch. TE-272-1, -2
Photofact Set 80, Folder 2

Subject: Shorted capacitors across the secondary of the Horizontal Output Transformer, T4.

Early production of the 12-1/2" picture tube chassis utilized two 270 mfd. capacitors in series across terminals 4 and 6 of T4. Breakdown of these capacitors resulting in a short across terminals 4 and 6 will show up as follows:

1. No high voltage - therefore no raster.

2. More frequently there will still be some high voltage, but no horizontal scan. Only a narrow vertical white trace displaced to right will appear on the picture tube.

Later production use a .047 mfd. 200 volt, molded, oil-filled capacitor across the width control, L23, instead of the two 270 mmf. capacitors across terminals 4 and 6 of T4. This change is recommended whenever the above breakdown trouble occurs and also on any early production 12-1/2" model brought in for service to forestall future trouble of this nature. The best connection for the .047 mfd. capacitor is between terminal 6 of T4 and the switch terminal of M4 that connects to terminal 5 of T4.

\- - -

Subject: Condition of one wide vertical black bar dividing the picture in half caused by high resistance short of C81.

The condition of one wide vertical black bar dividing the picture in half with the normal right side of the picture appearing on the left and left side on the right can be caused by C81 developing a high resistance short of 3 to 4 megohms.

The fault could prove to be difficult to find since normally the logical location of such a horizontal sync trouble would be in the horizontal oscillator and control circuit of C81. C81 connects between pin 2 of V17A and pin 2 of V8B.

\- - -

Subject: Buzz in the speaker with volume control at minimum.

In late productions the vertical output transformer, T5 was changed to an auto-transformer with 3 leads instead of 4.

If C89 is left with one side hooked to ground, vertical buzz will be present in the speaker. In those receivers in which this fault exists C89 should be connected to the junction of R102 and C4C instead of ground.

Two other possible sources of audio buzz are as follows:

1. The white and orange lead from pin 8 of V9B, the video amplifier being too loose and dressed close to the volume control terminals. Re-dress this lead.

2. C2C, 80 mfd. having an undesirable power factor or being leaky. Replace such a capacitor.

\- - -

Subject: Focus Control of the 12-1/2".

Some 12-1/2" receivers may exhibit lack of sufficient range of the Focus Control to properly focus the raster. A component change was executed in production to eliminate this possibility.

Any 12-1/2" set in the field can have this fault corrected quickly and easily by the following procedure without pulling the chassis from the cabinet.

1. Remove the bottom cabinet cover exposing a major portion of the chassis wiring.

2. On the front-side flange of the chassis two terminals are mounted in line. One of these terminal strips has on its end terminal a 330 ohm, 2 watt, R126, and a 10 ohm, 1/2 watt, R125, tied to it. Also, 2 red wires join on this terminal.

3. Connect one side of an 1800 ohm, 2 watt, 10%, resistor to this terminal.

4. Viewing the chassis from the bottom one can see another terminal strip (6 terminals) mounted on the main chassis below the above two which are on the front flange.

5. A green lead coming from the focus coil connects to a terminal beside the ground lug of the terminal strip.

6. Connect the other end of the 1800 ohm resistor to this point.

This 1800 ohm, 2 watt, resistor across the focus coil will improve the range of the focus control satisfactorily.

\- - -

Subject: Buzz in the audio on strong signals.

In some locations of strong signal strength "vertical buzz" is present in the audio which can be tuned to a minimum by the fine tuning control when tuned carefully for best sound reception. The follow-

ing change can be made very easily in the field for reducing this buzz in strong signal areas:

Change R75 from 120K to 75K

R75 connects to pin 5 of V15A and is accessible when the bottom cabinet cover is removed. Soldering a 200K ohm resistor in parallel with the 120K ohm will be the same as replacing it with a 75K ohm resistor--and is probably easier.

- - -

Subject: Accentuated white horizontal band near top of raster and touchy vertical sync.

It has been noted that some of the T3, vertical oscillator transformers, used in production since January 1, 1952 develop a parasitic which superimposes an added spike of voltage onto the return sweep part of the vertical sweep waveform. This results in a "bunching" of retrace lines about 1" from the top of the picture causing an accentuated white horizontal portion which can readily be seen when the brightness is increased.

A 2.2 megohm damping resistor across the primary of T3 (between the green and yellow leads) was added in production to forestall any such parasitic developing.

The parasitic in some cases results also in a very touchy vertical sync.

- - -

Models 2161, 2162, 2164 (Ch. TE-290)
Photofact Set 126, Folder 3

Variations in the capacity of the upper windings of the Horizontal deflection coils to ground in the AC23816-2 yoke appeared as a wiggle-waggle and ringing effect. This effect usually appeared as two or three light vertical bars caused by wavy raster lines in the left portion of the picture.

A compensating capacitor is used to correct for these variations. The variations of the AC23816-2 yoke could not be corrected with one value of fixed capacity and different values were used in production. Receivers were produced with the capacitor equal to 22, 27, 33, 39 and 47 mmf.

It may be necessary to change the value to one of the above mentioned values if this ringing effect appears objectionable. This condenser is easily accessible by removing the focalizer unit mounting plate and the plastic cover on the rear of the deflection yoke.

Part Number AC24292 yoke assembly is also used on the TE-290 chassis and one value, 47 mm. corrects for this capacity of the upper windings to ground.

- - -

Subject: Increasing the apparent sensitivity of Channel 7.

The performance can be improved on the deluxe chassis for channel 7 in fringe areas by lengthening the 300 ohm twin lead-in between the tuner and the antenna terminals and rerouting it. If the 300 ohm lead-in is close to the IF strip a harmonic of the IF is coupled into the lead causing the picture to appear snowy.

The lead should be lengthened 8" and rerouted as far away from the IF strip as possible, not using the 300 ohm lead stand off which is on the chassis. A convenient method is to staple the lead to the side of the cabinet-preventing any possibility of the lead accidentally falling near the chassis.

- - -

Subject: Possible reduction of snow and improvement of stability.

On some 16" deluxe chassis the metal shell of the 6AC7 radiates which causes pictures to appear snowy and to be unstable in weak signal areas. Normally the shield is grounded to a grounding lug with a lead approximately 1" long. This lead should be shortened and soldered directly to the chassis below pin 1, making the lead as short as possible. This will reduce the radiation and thus, will improve the performance of the set in weak signal areas.

- - -

Models 4162CM (Ch. TE-286)
Photofact Set 130, Folder 3

Models 5204, 5206 (Ch. TE-300)
Photofact Set 149, Folder 3

Models 5170, 5171, 5172, 5173 (Ch. TE-302,-1)
Photofact Set 142, Folder 5

Models 5210, 5211, 5212 (Ch. TE-315, -1,-2,-3,-4,-5
Photofact Set 151, Folder 5

- - -

Subject: Improving vertical stability of models that the vertical hold control is near the end of its range.

The vertical stability can be improved by reducing the value of the resistor in series with the vertical hold control so that the set holds sync with the control near center of its range.

- - -

Model 4162 (Ch. TE-286) replace R91 with resistor valve between 1 and 1.2 megohms.

Models 5204, 5206 (Ch. TE-302) replace R86 with resistor valve between 1.2 and 1.6 megohms.

Models 5170, 5171, 5172, 5173 (Ch. TE-302, -1) replace R85 with resistor valve between 1.2 and 1.6 megohms.

Models 5210, 5211, 5212, (Ch. TE-315, -1,-2,-3,-4,-5) replace R87 with resistor valve between 1.2 and 1.6 megohms.

This will increase the useable range of the vertical hold and thus improve the vertical stability of the set.

The PHOTOFACT Servicer

Vol. 18, Nos. 179 & 180 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ September 1, 1952

FACTORY SERVICE HINTS

The following Service Hints covering Stewart-Warner Television Receivers are brought to you through the courtesy of Stewart-Warner Electric, Division of Stewart-Warner Corp.

9200 Series, Photofact Set 132, Folder 13

Improved Vertical Hold

In weak signal areas, or in locations adversely affected by external electrical interference, it is possible to improve the vertical sync stability on 9200 series receivers by making the following modifications.

1. Change resistor R56 in plate circuit of sync phase inverter tube 12AU7 (V11) from 3300 ohms to 6800 ohms.
2. Change resistor #R58 in plate circuit of phase splitter tube 12AU7 from 56,000 ohms to 27,000 ohms.

Horizontal Multivibrator Squeal

During the warm-up period immediately after the receiver was turned on, certain 9200 series receivers emitted a high pitched squeal. This condition can be overcome by incorporating the following circuit changes.

1. Change condenser C69, C70 in plate circuit of 6SN7GT Horizontal Scanning Multivibrator to 390 mmf. (one unit).
2. Change resistor R76 in plate circuit of 6SN7GT Horizontal Multivibrator from 330,000 ohms to 680,000 ohms.
3. Change resistor R74 in plate circuit of 6SN-7GT Horizontal Multivibrator from 3900 ohms to 3300 ohms.
4. Add 270,000 ohm, 10%, 1/2 Watt resistor from pin 5 of 6SN7GT Horizontal Multivibrator to 310 volt B+ supply.

\- - -

H. V. Transformer Fuse Blowout

Under certain conditions, cumulative effects developed in the Horizontal Multivibrator stage caused a momentary surge current in the plate circuit of the 6BQ6GT output tube which would blow the protective fuse M2. This condition was only existent during the warm-up period of the receiver and can be corrected by applying those four changes indicated under "Horizontal Multivibrator Squeal."

9202 Series Phtofact Set 172, Folder 9

Vertical Bending

In moderate or strong signal areas, vertical bending may be encountered on the 9202 series of receivers which include the letter "F" in the series coding. In that particular series of receiver, the 27,000 ohm isolating resistor R58 was removed from the plate circuit of the 12AU7 Phase Inv. tube. That action was taken to further improve sync stability in weak signal areas, but vertical bending may then be encountered on those receivers located in medium or strong signal areas. To overcome this bending action, re-insert resistor R58.

* * *

9202 Series, Photofact Set 158, Folder 12
9203 Series, Photofact Set 166, Folder 14

It is possible to further improve sensitivity and sync stability on model 9202 and 9203 receivers by incorporating the changes listed below. Model 9202 receivers coded "Series E" and model 9203 receivers coded "Series C" already contain this modification.

1. Replace all 6AU6 IF amplifier tubes with 6CB6 tubes.
2. Connect socket pin 7 to ground for each of the three IF tubes. (This is the suppressor pin on the 6CB6 tube).
3. Remove 2.2 mmf. condenser from grid circuit of 1st IF stage.
4. Change 1st IF grid resistor from 8200 ohms to 12,000 ohms.
5. Change 1st IF cathode resistor from 47 ohms to 68 ohms. Connect it from pin 2 to ground.
6. Change 2nd IF grid resistor from 8200 ohms to 10,000 ohms.
7. Change 2nd IF cathode resistor from 82 ohms to 47 ohms. Connect it from pin 2 to ground.
8. Change 3rd IF grid resistor from 12,000 ohms to 10,000 ohms.
9. Change AGC load resistor from 47,000 ohms to 8200 ohms.
10. All components previously connected to pin 7 of the 3rd IF tube should now be connected to pin 2.

11. Re-align all IF stages to new frequencies indicated:

Converter plate	23.5 mc.
1st IF	23.5 mc.
2nd IF	25.9 mc.
3rd IF	25.9 mc.

* * *

Increased Fringe Area Sync Stability on All 19 Tube Chassis

The following circuit changes should be incorporated into all 19 tube chassis that are being operated in extreme fringe areas. These changes will result in greatly improved sync stability under conditions of weak signal. Do not make this change on chassis located in strong or moderate signal areas.

1. Add a 10 megohn 1/2 watt resistor from pin 4 of the 6SN7GT sync amplifier tube to 135 B+. (This resistor is already included in some chassis).

2. Disconnect pin 6 of the 6AC7 video amplifier from 135 V B+ and insert an 8200 ohm 1 watt resistor.

3. Add a 12,000 ohm 1 watt resistor from pin 6 of the 6AC7 video amplifier to chassis ground.

4. Add a .25 mfd. 200 volt condenser from pin 6 of the 6AC7 video amplifier tube to ground.

Instructions for Installing and Adjusting Adjacent Sound Trap on 19 Tube Chassis Using 6AU6 IF Tubes

Adjacent Channel sound trap, S. W. part 52021, comprised of a slug tuned coil and fixed ceramic condenser, was designed to minimize interference caused by the sound carrier of the lower frequency adjacent channel.

Installation

When required, the adjacent channel sound trap is to be added to the screen circuit of tube V3 (6AU6) 1st IF amp. and this can be accomplished by following the procedure outlined below.

1. Mount the trap coil in the hole located adjacent and to the left of tube V3 (6AU6) 1st IF amp. The coil must be inserted from the under side of the chassis and pushed through the hole until the mounting clip snaps into position.

2. Disconnect 100 ohm resistor from pin 6 of tube V3 (6AU6) 1st IF amp.

3. Carefully remove 5000 mmf. condenser from pin 6 of tube V3 (6AU6) 1st IF amp. as well as chassis ground connection.

4. Disconnect the B+ terminal of 1st IF coil from pin 6 of tube V3 (6AU6) 1st IF amp.

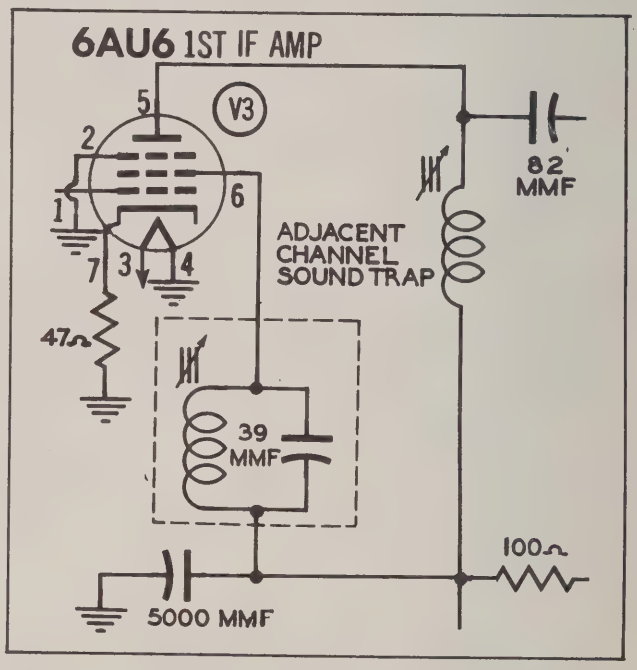
5. Connect one terminal of the trap coil directly to pin 6 of tube V3 (6AU6) 1st IF amp.

6. Connect other terminal of trap coil to the terminal of 1st IF coil, which was disconnected in step 4.

7. Connect open end of 100 ohm resistor to the junction of 1st IF coil and trap coil.

8. Connect 5000 mmf. condenser removed in step 3, by wiring one end to the junction of 1st IF coil and trap coil. The other end of this condenser should be grounded at a point close to the 1st IF coil.

The circuit diagram below shows this sound trap wired into the receiver circuit.



Adjustments

After installing the adjacent channel sound trap in the proper manner, it will be necessary to make the following adjustments:

1. Rotate the slug counter clockwise until stem of slug is out as far as possible.

2. Properly tune receiver for a normal picture by using fine tuning control on front panel of receiver. Do not touch this control during the rest of the adjustment procedure.

3. Connect a standard signal generator through a 330 mmf. condenser to point E on the RF tuner and a VTVM to the green lead coming from the crystal detector shield can point A.

4. Set the signal generator accurately to 28.25 mc.

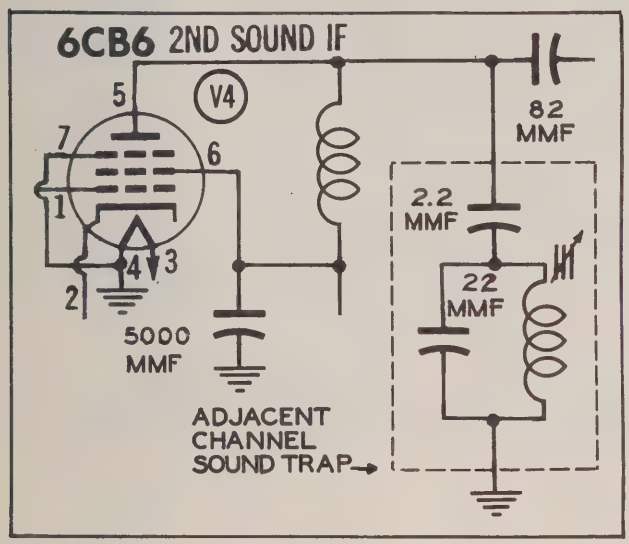
5. Adjust adjacent channel sound trap slug for minimum reading on the VTVM.

6. With a normal picture and a properly tuned receiver, a slight readjustment of adjacent channel sound trap coil slug may be necessary in weak signal areas to further minimize sound interference as viewed on the screen.

Adjacent Channel Sound Trap for All 19 Tube TV Chassis Using 6CB6 IF Tubes

It has been found that the adjacent channel sound trap referred to above does not always provide complete traping action on the 19 tube chassis using 6CB6 IF tubes. A new trap was designed for those receivers and the information required to insert them into the receiver is indicated below.

Adjacent channel sound trap, S. W. part 520638, comprised of a slug tuned coil and two fixed condensers, was designed to minimize interference caused by the sound carrier of the lower frequency adjacent channel.



Installation

When required, the adjacent channel sound trap is to be added to the plate circuit of tube V4 (6CB6) 2nd IF amp. and this can be accomplished by following the procedure outlined below.

1. Mount the trap coil in the hole located directly in front of tube V5 (6CB6) 3rd IF amp. The coil must be inserted from the under side of the chassis and pushed through the hole until the mounting clip snaps into position.
2. Connect open end of 2.2 mmf. condenser to pin 5 of tube V4 (6CB6) 2nd IF amp.
3. Connect the junction of the 22 mmf. condenser and the coil to chassis ground.

The circuit diagram shows the sound trap wired into the receiver circuit.

* * *

Adjustments

After installing the adjacent channel sound trap in the proper manner, it will be necessary to make the following adjustments:

1. Rotate the slug counter clockwise until stem of slug is out as far as possible.
2. Properly tune receiver for a normal picture by using fine tuning control on front panel of receiver. Do not touch this control during the rest of the adjustment procedure.
3. Solder a pigtail to the tube shield of V2 (Mixer-Osc.). Lift this shield so that it is not grounded to chassis, but do not remove it from tube.
4. Connect a standard signal generator to the pigtail and a VTVM to the green lead coming from the crystal detector shield can.
5. Set the signal generator accurately to 27.4 mc.
6. Adjust adjacent channel sound trap slug for minimum reading on the VTVM.
7. With a normal picture and a properly tuned receiver, a slight readjustment of adjacent channel sound trap coil slug may be necessary in weak signal areas to further minimize sound interference as viewed on the screen.

NEW PARTICIPANT

"P. R. Mallory & Co., Inc., Indianapolis 6, Indiana.

Mallory replacement capacitors, variable resistors, rectifiers, and vibrators will again be listed in PHOTOFACT folders starting with Set No. 175."

BOOK REVIEW

Electronics For Communications Engineers
by John Markus and Vin Zeluff
Associate Editors of Electronics

McGraw-Hill Book Company, Inc.
New York 10, N. Y.
610 pages - $10.00

This book is composed of 252 technical articles which have appeared in ELECTRONICS magazine. Topics are arranged by subject in sixteen chapters including material on amplifiers, components, filters, oscillators, power supplies and transmission lines.

Design data and circuit details of both commercial and custom-built electronics organs is also included.

Giving engineers carefully selected articles, equations, charts, nomographs, and data is the purpose of this book. It will save much time in research and experimental work.

* * *

New! Supplementary Manufacturers' Replacement Listings

We are undertaking an experimental feature designed to give you the latest information on TV replacement parts listings. Only those listings of new components which were not available at the time of publication of the PHOTOFACT Folder, are included in this supplementary listing experiment.

A very few minutes will be required to transfer this up-to-date information to the appropriate folder. Just refer to the proper folder and page number given in the listing below, and insert the previously unavailable replacement part number in the blank space in the folder.

To make this initial experimental supplementary listing, we are utilizing new data from Stancor (Standard Transformer Corporation) with whom we have worked closely on this project.

We are undertaking this experiment to help make your service work faster and easier. We want you to be a judge of its value. It will be continued only if you can and will use it. So study the listings below - then tell us how you like this new service. At the end of the listing, you will find a handy questionnaire. Please fill it out and send it in - - you'll help us decide on the value of this service to you. Your comments will be appreciated - - we'll abide by the majority decision.

SUPPLEMENTARY STANCOR TV TRANSFORMER REPLACEMENTS

PHOTOFACT FOLDER				APPLICATION			
Set No.	Folder No.	Page No.	Name	Item No.	Part No.	Stancor Replacement	Description
66	6	16	Crosley	T3	D-160015-2	A-8124	Vertical Block. Oscillator
68	16	16	Strom.-Carl.	T3	161232	A-8124	Vertical Block. Oscillator
72	8	18	DuMont	T3	20003931	A-8124	Vertical Block. Oscillator
81	6	15	Crosley	T7	B-145563	FC-11	Focus Coil
85	10	15	Olympic	T7	CL-1842	FC-11	Focus Coil
86	10	19	Sparton	T7	- -	FC-11	Focus Coil
87	13	16	Teletone	T7	TLF-522-D	FC-11	Focus Coil
90	3	17	DuMont	T2	20D-4901-2	A-8124	Vertical Block. Oscillator
92	7	15	Starrett	T6	- -	FC-11	Focus Coil
93	2	15	Arvin	T6	C-22853	FC-11	Focus Coil
93	4	15	DuMont	T2	20004142	A-8124	Vertical Block. Oscillator
93	10	15	Teletone	T6A	TLF-522-D	FC-11	Focus Coil
94	3	17	Crosley	T2	D-160015-2	A-8124	Vertical Block. Oscillator
94	6	16	Packard Bell	T6	29519	FC-11	Focus Coil
95	3	18	DuMont	T3	20003931	A-8124	Vertical Block. Oscillator
96	10	17	Starrett	T7	- -	FC-11	Focus Coil
101	12	23	Starrett	T6	- -	FC-11	Focus Coil
104	12	15	Teletone	T6	TLF-522-D	FC-11	Focus Coil
105	3	16	Altec Lansing	T5	- -	FC-11	Focus Coil
106	4	11	Crosley	T6	AB-147430	FC-11	Focus Coil
109	14	13	Teletone	T6	TLF-522-1D	FC-11	Focus Coil
111	3	19	Bendix	T5	LCOF04	FC-11	Focus Coil
113	7	15	RCA	T1	75508	P-8163	Power Transformer
122	6	13	Packard-Bell	T6	29519	FC-11	Focus Coil
122	8	18	RCA	T1	75508	P-8163	Power Transformer
123	10	13	Packard-Bell	T6	29519	FC-11	Focus Coil
126	4	13	Crosley	T6	AB-149539	FC-11	Focus Coil
126	9	14	Packard-Bell	T6	29519	FC-11	Focus Coil
129	5	13	Crosley	T6	AB-148781	FC-11	Focus Coil
129	8	14	Packard-Bell	T6	29519	FC-11	Focus Coil
133	8	13	Majestic	T6	C9.243	FC-11	Focus Coil
134	9	15	RCA	T1	75508	P-8163	Power Transformer
143	12	15	RCA	T1	75508	P-8163	Power Transformer
146	11	13	Trav-ler	T6	TV-L-26	FC-11	Focus Coil

WHAT'S YOUR OPINION OF THIS SERVICE: Please fill out below and send in this slip.

☐ I like this Supplementary Listing Service because: _____

_____

_____

_____

☐ I do not need this Service because: _____

_____

_____

_____

Just check above and mail to:
HOWARD W. SAMS & CO., INC.
2201 East 46th Street
Indianapolis 5, Indiana

Your Name and Address (If you care to give it.) _____

_____

The PHOTOFACT Servicer

Vol. 18 Nos. 175 & 176 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ July 1, 1952

NOTICE

Immediately following this servicer you will find a revised schematic diagram of Folder 13, Set 169, covering RCA Victor Models 17T150, 17T151, 17T163 (Ch. KCS66C), 17T172K, 17T173K, and 17T174K (Ch. KCS66D). This revised sheet replaces the original schematic and front page of that folder.

* * *

The following service hints covering, Sylvania receivers are brought to you through the courtesy of Sylvania Electric Products Company.

All TV Receivers using 6BQ6 or 6CD6 Tubes

Corrosion inside of the plate caps causing poor contact can result in low H.V. Thorough cleaning to a bright surface is recommended to insure proper contact.

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All TV Receivers

Arcing and Corona at Anode Button. Dirt accumulation around anode button may lead to belief that picture tube is defective. This is particularly true on sets using rubber anode cap. The rubber anode cap may be removed and discarded and the insulated area around the button thoroughly cleaned with scouring powder and water and then polished dry. This procedure will not affect the operation of the set and may eliminate needless picture tube replacement.

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TV Model 22M-2 (Ch. 1-387-1)
Photofact Set 154, Folder 12

4.5 mc. harmonic interference may be reduced by redressing the speaker leads so that they are as far away from the antenna leads as possible. The antenna should also be kept away from the speaker frame. This remedy may also be applicable when interference of this type is encountered on other models.

\- - -

Radio Ch. 1-601-1, Photofact Set 160, Folder 12
Radio Ch. 1-602-1, Photofact Set 159, Folder 13

High residual hum in these chassis may be corrected by removing .022 mfd. capacitor, (Item C8 in Ch. 1-601-1 and Item C7 in Ch. 1-602-1), from its B- return point and reconnecting it across the primary of the output transformer. It is recommended this be done as a field fix. Intermittent hum can be caused by a defective 50C5 output tube.

TV Ch. 1-437-1, Photofact Set 131, Folder 15

To improve video IF performance on the chassis Item R29, video IF transformer loading resistor has been changed from 27K 1/2 watt to 22K 1/2 watt.

\- - -

TV Ch. 1-168 (B19 and up), Photofact 99, Folder 17

When poor focus or a very dark picture is observed on this chassis it may be due to little or no voltage being supplied to the screen grid (Pin #10) of the picture tube. Additional symptoms of this condition are that the ion trap magnet adjusts to a position far out of normal and the brightness and contrast controls must be turned full on. Check particularly, Item C117 -15 mmf. 1000 volt mica capacitor and Item V27-6X4 Picture tube screen Supply Rectifier.

\- - -

All TV Receivers using 5642 Tubes

When replacing 5642 tubes, special care should be taken to center the tube between the terminal lugs so that the lead length between the tube and lug is equal for all three leads. This will decrease the risk of soldering too close to the glass which may otherwise cause a defective tube. All solder joints should be formed with a well rounded ball of solder. Sharp point edges will cause corona and must be removed.

\- - -

TV Chassis 1-356

Vertical hold control critical. Check RF tubes in tuner for heater to cathode leakage. This leakage may cause sufficient hum modulation to trip vertical sync circuits.

\- - -

Radio Model 430L, Photofact Set 165, Folder 15

Consistant tube filament failure. Check for leakage between 200 mfd. section and either 40 mfd. section of three section electrolytic capacitor. Item C1.

\- - -

TV Receivers - Calibration of Tuners

Tuners used with chassis 1-260, 1-261, 1-271, 1-274, 1-290, 1-356, 1-357, 1-366, 1-366-66, 1-381, 1-437, 1-442. On this tuner the pointer assembly consists of two plastic pieces held together with screws. To change calibration, loosen these screws, the cutout portion of the pointer may then be rotated

about the hub until the correct channel number appears in the cutout. When correctly set, tighten screws securely.

Tuner used with chassis 1-441. The position of the dial may be changed by loosening the two Allen head set screws on the condenser drive gear assembly and slipping these gears until the correct channel indication is obtained.

Tuner used with chassis 1-387. The correct position for channel 2 may be obtained by turning the channel knob to the fully clockwise position and then backing off 90°. The correct position for channel 13 may be obtained by turning the channel knob to the fully counterclockwise position and backing off 45°. The dial position may then be changed by removing the retaining ring from in front of the dial drive shaft, pulling the shaft slightly forward to disengage the gears, rotating until the correct channel number appears, and returning the dial drive shaft into gear engagement and replacing the retaining ring.

\- - -

All TV Receivers

Power transformer lamination buzz may be effectively treated by inserting a wooden wedge between the coil and center leg of the core. This may be done without disconnecting the transformer by removing the transformer bolts and lifting the cover. Be sure to tighten bolts evenly and securely.

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TV Ch. 1-139, Photofact Set 92, Folder 8
TV Ch. 1-168, Photofact Set 99, Folder 17
TV Ch. 1-186, Photofact Set 113, Folder 9

Horizontal size control burns up frequently. Check for -125 volt line to ground short particularly through leaky bypass capacitors across these two points. This will change the bias of the horizontal output tube sufficiently to draw excessive plate current.

\- - -

TV Ch. 1-260, 1-261, 1-366
Photofact Set 124, Folder 10

TV Ch. 1-271, 1-290, Photofact Set 120, Folder 10
TV Ch. 1-274, 1-357, Photofact Set 131, Folder 15

Most common troubles in early productions of above chassis in high voltage scanning assembly.

1. Dress of the filament turns for the 5642 H V rectifier tubes. These filament turns must be dressed against plastic case in the slots provided and in particular must be kept away from H V scanning transformer winding. When the filament leads get too close to this winding, corona discharge takes place lowering the high voltage. Eventually arc-over may occur, necessitating complete replacement of the filament lead and H V scanning transformer.

2. Broken leads on the H V scanning transformer windings particularly where the leads bend over the edge of the terminal board. This is often hard to locate due to fineness of wire.

3. Solder splash on winding. This will cause corona discharge with consquent lowering of high voltage.

4. Defective 5642. This is usually found to be the upper one.

* * *

VALUABLE ADDITIONS TO PHOTOFACT FOLDERS

Tube Failure Check Chart -

Beginning with PHOTOFACT Folder Set 175 a Tube Failure Check Chart will be included in television PHOTOFACT Folders, adjacent to and for use with the Tube Placement Chart, top view. This chart lists the tubes whose failure is most likely to produce the indicated symptoms.

Since they will always be presented in the same order and in the same chart form, the technician will be able to quickly analyze the probable tube failure causing his trouble. By familiarity with the circuit from the rest of the PHOTOFACT Folder, he should be able to isolate a defective circuit if tube failure is not the direct cause of his trouble.

* * *

Tube Key or Blank Pin Locations -

In set 145 of PHOTOFACT Folders we introduced a new type of tube placement chart, which shows the blank pin or key location of the socket into which tubes are being inserted. Since the technician is many times working under handicaps of lighting and relatively inaccessible locations, this indicator line drawn on each tube socket becomes a valuable help.

* * *

Fuse Location Data -

Recent television PHOTOFACT Folders are also showing the fuse location, the fuse rating and the circuit which is protected. This data on the Tube Placement Chart proves valuable since in many cases more than one fuse is used and sometimes the fuses are placed in such a location as to not be visable from the back and top of the chassis.

* * *

Oscilloscope Wave Forms -

Television Folders from approximately Set 156 on have shown reproduction of actual wave forms taken at a series of points through each chassis. These wave forms are photographed in our laboratory from an oscilliscope connected to the actual receiver and are included on the PHOTOFACT Standard Schematic Diagram. They not only indicate the correct wave shape at various points, but also show the proper peak-to-peak voltage values at critical points in the receiver. This data is taken under standard conditions in such a manner that the service technician can set up and duplicate the results. To enable the technician to better understand the use of these wave forms a continuing series of articles entitled: "The Value of Wave Form Analysis" has appeared in the PF INDEX and Technical Digest Numbers 30, 31 and 32.

Voltage Values on Schematics -

For sometime now, all PHOTOFACT Folders have been presented with the operating voltages indicated right on the schematic diagram. These voltages are given at each tube pin and reports indicate that this service has already saved a considerable amount of technical time in trouble shooting work.

* * *

Orientation of Tube Placement Charts -

We mentioned the tube pin location, which has been added to the tube placement chart, but we failed to mention the fact that all recent Tube Placement Charts had been presented with the same orientation on the page as the receiver will have on the service bench. This was introduced to enable the technician to make maximum use of the Tube Placement Chart without having to reorient the Tube Placement Diagram, and then find that a copy was in the wrong position to be properly read.

* * *

Summary -

Remember all of these services have been added to PHOTOFACT Folders at no additional cost to you! It is our established policy to make whatever additions or changes are necessary to keep PHOTOFACTS the "World's Finest Service Data"! Constantly improving our presentation and adding whatever data is necessary to make the service complete is part of our basic thinking.

* * *

The following service hints are brought to you through the courtesy of the Capehart-Farnsworth Corporation, "Capehart Service Bulletin."

Chassis CX-33, Photofact Set 112, Folder 3
Prod. Chge. Bul. 13, Set 122, Folder 1
Prod. Chge. Bul 24, Set 142, Folder 1

"Whistle" in sound and or lines in picture (similar to Barkhausen oscillation).

a. Additional, bypassing may be needed in the B minus circuit. Add a .1 mfd., 200V cap. from -90V point to chassis ground (near 6BG6 tube, junction of R97 & R98).

\- - -

Insufficient Vertical Scan

a. Change R81 from 2.2 meg. to 3.9 meg.

b. Change R75 from 22K to 47K (any production run).

c. Change 6K6 (Vert. output) to 6V6 or 6F6.

\- - -

Picture "Jitter" Vertical

a. Possibly "leaky" coupling cap. between Sync. Amp., & Sync. Clipper C54 (100 mmf.).

Intermittent Vertical Sync Buzz

a. Over modulation at TV transmitter.

b. Insufficient drive at ratio detector. Connect a 3 mmf. cap. between terminals 2 and 4 of 45. Check sound alignment.

\- - -

Small Section of Picture Shifts Horizontally

a. Leaky Capacitor C82, 30 mmf., 6KV.

\- - -

Sound Modulation of Horizontal Oscillation

a. Open or low value capacitor C5.

b. R54 wrong value.

\- - -

Intermittent Narrowing of Picture

a. Possibly excessive winding capacity of Damper Tube heater isolation transformer T2.

\- - -

Insufficient Horizontal Scan

a. Add .1 mfd., 200V, Item C83, across R9 cathode resistor of 6BG6 tube.

b. Change R94 to 47K.

c. Connect a 30 mmf. 6KV cap., Item C82, 6W4 cathode to ground. If additional scan is needed connect it from 6BG6 plate to ground.

\- - -

Inability to Phase Picture Correctly

a. Change C70 to .001 mfd. and R91 to 100K. (See Prod. Chge. Bul. 13, Set 122, Folder 1)

b. Bad Horizontal Oscillator tube.

c. C69 (100 mmf.) open.

\- - -

High Voltage Circuit Arcing or Corona

a. Check lead dress around 1B3 tube socket.

b. Check dress of transformer T3 leads.

\- - -

Picture Blooming

a. Connect in series with the cathode of the CRT (pin 11) a 100K resistor and .1 mfd., 200V cap. in parallel. (See Prod. Chge. Bul. 13, Set 122, Folder 1).

\- - -

Corner Cutting of Picture

a. Reposition focus coil by loosening 4 self-tapping screws which hold focus coil in bracket.

b. Loosen deflection yoke Mtg. bracket and push yoke as forward as possible.

c. Adjust ion trap magnet, within range of max. brilliance to eliminate.

- - -

Unable to Properly Align Sound Take-Off Transformer (L15)

a. Possible that due to material variation the tuning range has drifted. If so, connect a 5 mmf. cap. between terminals 3 & 4 of L15.

- - -

Unable to Obtain Proper Focus

a. Check adjustment of focus control and position of focus coil.

b. Check resistance of focus coil.

c. Connect a 2.2K, 2 watt resistor in parallel with R4 and R108B.

- - -

Vertical Instability

a. R78 (38K, Temp. Comp.) changes value.

b. R69 decreases in value.

- - -

Intermittent Horizontal Sync

a. C64 partially shorted.

- - -

Horizontal Osc. Instability

a. C69, leaky.

b. Change in resistance of R107A or R107B.

- - -

Oscillations in Video

a. Defective 6BG6 or 6W4 tube.

- - -

120 Cycle AC in Picture

a. Shorted filter choke L1.

b. Defective Filter Condenser, C2A, C2B, C1A or C1C.

* * *

Model CX-33DX Photofact Set 160, Folder 2

"Flag Waving" or Bending of the Picture at the Top, (CX-33DX) - A 10K, 1/2 Watt resistor and a .22 mfd., 200V capacitor have been added in series across C71 (.047 mfd.) in the horizontal AFC delay network. This change has been incorporated in production and it is suggested that it also be made in the field on any earlier production CX-33DX chassis displaying these symptoms.

Repetitive Contraction of Vertical Linearity (CX-33 DX) - A condition of vertical linearity instability evidenced by a cyclic, or repetitive, expansion and contraction in the vertical direction of a portion of the picture can be corrected by the following circuit change. Remove the center arm of the Height control (R10) from +310V and connect to the junction of R97 and C18. Remove R97 from +310V and connect to +290V. All connections are in a convenient position and it should take only a few seconds to change the wires involved.

* * *

The PHOTOFACT Servicer

April 15, 1952 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ Vol. 17, Nos. 167 & 168

REGISTRATION LISTS

of

RTMA PRODUCTION SOURCE CODE

Code symbols assigned to radio-television manufacturers and suppliers, arranged both alphabetically by companies and numerically by code numbers.

Following is the latest 1952 list, incorporating all changes and additions previously published in the PHOTOFACT Servicer.

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RADIO-TELEVISION MANUFACTURERS ASSOCIATION
777 14th Street, N. W., Washington 5, D. C.

HOWARD W. SAMS & CO., INC.
Indianapolis 5, Indiana

COMPANY	CODE NO.
*Acme Electric Corporation, Cuba, N. Y.	413
+Adaptol Company, Brooklyn 13, N. Y.	436
*Admiral Corporation, Chicago 47, Ill.	101
Advance Transformer Company, Chicago 40, Ill.	669
Aerovox Corporation, New Bedford, Mass.	102
+Airadio, Incorporated, Stamford, Conn.	103
Aircraft-Marine Products, Inc., Harrisburg, Pa.	581
*Airdesign, Incorporated, Upper Darby, Pa.	476
+Aireon Manufacturing Corporation, Kansas City 15, Kan.	104
*Ajax Condenser Co., Inc., Chicago 14, Ill.	705
*Aladdin Radio Industries, Chicago, Ill.	689
+Alamo Tel. & Radio Co., San Antonio, Texas	645
Alcon Metal Products, Inc., Chicago 47, Ill.	573
Allen-Bradley Company, Milwaukee 4, Wis.	106
The Alliance Manufacturing Co., Alliance, Ohio	107
All Star Products, Inc., Defiance, Ohio	110
Alpha Metals, Inc., Brooklyn 1, N. Y.	733
*Altair Corporation, New York 13, N. Y.	747
Altec Lansing Corporation, Beverly Hills, Calif.	391
+American Coil & Engineering Company, Chicago 22, Ill.	108
American Condenser Company, Chicago 40, Ill.	109
*American Insulator Corporation, New Freedom, Pa.	585
American Lava Corporation, Chattanooga 5, Tenn.	681
American Phenolic Corporation, Chicago 50, Ill.	554
*American Radio Hardware Co., Inc., Mt. Vernon, N. Y.	502
*American Radionic Co., Inc., Brooklyn 17, N. Y.	648
American Structural Products Co., Sub. of Owens-Illinois Glass Co., Toledo 1, Ohio	647
+American Transformer Co., Newark 5, N. J.	350
American Television, Inc., Chicago 5, Ill.	633
American Television & Radio Co., St. Paul 1, Minn.	551
+American Volume Control Corporation, New York 6, N. Y.	519
*The American Woodworking Co., West Haven 16, Conn.	729
Amperex Electronic Corporation, Brooklyn 1, N. Y.	111
Ampro Corporation, Chicago 18, Ill.	673
Amy, Aceves & King, Inc., New York 18, N. Y.	112
*Anaconda Wire & Cable Company, Hastings-On-Hudson 6, N. Y.	547
*Anchor Electronics Inc., Union City, N. J.	707
*Anchor Industrial Company, New York 13, N. Y.	629
Anchor Radio Corporation, Chicago 23, Ill.	623
Andrea Radio Corporation, Long Island City 1, N. Y.	113
Andrew Corporation, Chicago 19, Ill.	402
Arthur Ansley Manufacturing Co., Doylestown, Pa.	717
+Ansley Radio Corporation, Long Island City 1, N. Y.	114
+Ansley Radio & Television Inc., Trenton 9, N. J.	600
Arcturus Electronics Inc., Newark 4, N. J.	667
+Argus, Incorporated, Ann Arbor, Mich.	344
A. R. F. Products, Inc., River Forest, Ill.	115
The Arnold Engineering Company, Sub. of Allegheny Ludlum Steel Corp., Marengo, Ill.	116
+Arpee Products Co., Glendale, Calif.	386
+Arpin Manufacturing Co., Orange, N. J.	117
Arvin Industries, Inc., Columbus, Ind.	248
The Astatic Corporation, Conneaut, Ohio	345
Audak Company, Inc., New York 18, N. Y.	517
*Audio Electric Company, Chicago 26, Ill.	514
+The Audio-Tone Oscillator Co., Bridgeport, Conn.	118
Automatic Manufacturing Corp., Newark 4, N. J.	119
Automatic Radio Mfg. Co., Inc., Boston 15, Mass.	120
+Bachmann Bros. Inc., Philadelphia 24, Pa.	378
+Bank's Manufacturing Company, Chicago 40, Ill.	121
Barker & Williamson, Upper Darby, Pa.	461
Barnes Metal Products Company, Chicago 23, Ill.	588
Basler Electric Company, Highland, Ill.	695
The Bead Chain Manufacturing Co., Bridgeport 5, Conn.	122
Belden Manufacturing Company, Chicago 44, Ill.	579
+Bell & Howell Company, Chicago 45, Ill.	123
Bell Sound Systems, Inc., Columbus 7, Ohio	708
Belmont Radio Corporation (Raytheon Manufacturing Co.) Chicago 39, Ill.	124
Bendix Radio, Division of Bendix Aviation Corporation, Baltimore 4, Md.	125
Bentley, Harris Mfg. Company, Conshohocken, Pa.	126
+The Benwood Linze Company, St. Louis 3, Missouri	127
+Bernard Rice's Sons, Inc., New York 16, N. Y.	429
*Best Manufacturing Co., Inc., Irvington 11, N. J.	371
Bliley Electric Company, Erie, Pa.	128
David Bogen Co., Inc., New York 12, N. Y.	589
+Boonton Molding Company, Boonton, N. J.	355
+Boonton Radio Corporation, Boonton, N. J.	129
+Bowers Battery and Spark Plug Co., Reading, Pa.	619
The William Brand and Co., Inc., Willimantic, Conn.	130
British Industries Corporation, New York 13, N. Y.	409
Brunswick Division of Radio & Television, Inc., New York 19, N. Y.	278
+Browning Laboratories, Inc., Winchester, Mass.	131
Caledonia Electronics & Transformer Corp., Caledonia, N. Y.	503
+Caliri Mfg. Co., West Orange, N. J.	641
Camburn, Inc., Woodside, Long Island, N. Y.	430
C. F. Cannon Co., Springwater, N. Y.	133
Cannon Electric Company, Los Angeles 31, Calif.	440
Capehart-Farnsworth Corporation, Fort Wayne 1, Ind.	177
Carbonneau Industries, Inc., Grand Rapids 2, Mich.	719
Carter Parts Company, Chicago 10, Ill.	610
CBS-Columbia Inc. (Sub. of Hytron Radio & Electronics Co.) Brooklyn 32, N. Y.	105

COMPANY	CODE NO.
Celco (Constantine Engineering Labs. Co.) Mahwah, N. J.	692
Centralab, Div. of Globe-Union Inc., Milwaukee 1, Wis.	134
Central Coil Company, Inc., Indianapolis 22, Ind.	637
+Central Commercial Co., Chicago 4, Ill.	650
Chicago Condenser Corporation, Chicago 47, Ill.	135
*Chicago Electronic Engineering Co., Inc., Chicago 47, Ill.	166
Chicago Molded Products Corp., Chicago 51, Ill.	136
Chicago Telephone Supply Corp., Elkhart, Ind.	137
Chicago Transformer Division, Essex Wire Corporation, Chicago 18, Ill.	138
+Churchill Cabinet Co., Chicago 47, Ill.	627
+Cinaudagraph Div., Indiana Steel Products Co., Stamford, Conn.	358
+Cinaudagraph Speakers, Division of Aireon Manufacturing Corp., Kansas City 15, Kansas	468
Cinch Manufacturing Corporation, Chicago 24, Ill.	139
Clarostat Mfg., Co., Inc., Dover, N. H.	140
Cleveland Electronics, Inc., Cleveland 3, Ohio	433
Clippard Instrument Laboratory, Inc., Cincinnati 14, Ohio	530
*Coil Engineering & Mfg. Co., Inc., Roanoke, Ind.	141
Collins Radio Company, Cedar Rapids, Iowa	439
+Colonial Radio Corporation, Buffalo 7, New York	142
Columbus Electronics Corporation, Yonkers, N. Y.	528
Columbus Process Co., Inc., Columbus, Ind.	450
+Communication Equip. & Engineering Co., Chicago 44, Ill.	143
+Communications Co., Inc., Coral Gables 34, Florida	462
Communication Measurements Laboratory, Inc., New York 6, N. Y.	427
+C. G. Conn, Ltd., Federal Recorder Co., Elkhart, Ind.	144
Conrac Incorporated, Glendora, Calif.	680
*Consolidated Radio Products Co., Chicago 10, Ill.	145
Consolidated Wire & Associated Companies, Chicago 16, Ill.	607
Continental Carbon Inc., Cleveland 11, Ohio	146
Continental Electric Company, Geneva, Ill.	147
*Control Corporation, Minneapolis 14, Minn.	712
Co-Operative Industries, Inc., Chester, N. J.	760
Copperweld Steel Company, Glassport, Pa.	725
Corning Glass Works, Corning, N. Y.	148
Cornish Wire Company, Inc., New York 7, N. Y.	149
Cosmic Radio Corporation, New York 59, N. Y.	704
Crescent Industries, Inc., Chicago 31, Ill.	150
Crimp-Seal Products Co., Chicago 10, Ill.	422
Croname, Incorporated, Chicago 13, Ill.	151
Crosley Division, Avco Manufacturing Corp., Cincinnati 25, Ohio	152
+Crown Capacitor Corporation, Wrentham, Mass.	591
+Crystal Research Laboratories, Inc., Hartford 3, Conn.	153
Crucible Steel Company of America, New York 17, N. Y.	525
*The Danbury Transformer Corp., Danbury, Conn.	764
J. W. Davis & Company, Dallas 9, Texas	593
*Davis Electric Company, Cape Girardeau, Mo.	628
*Dearborn Glass Company, Chicago 8, Ill.	385
Delco Radio Division, General Motors Corporation, Kokomo, Ind.	466
+Deluxe Coils, Inc., Wabash, Indiana	598
+DeMornay-Budd, Incorporated, New York 51, N. Y.	377
*Tobe Deutschmann Corporation, Norwood, Mass.	154
Dewald Radio Mfg. Corp., Long Island City 1, N. Y.	155
*Dormitzer Electric & Mfg. Co., Inc., Cambridge, Mass.	493
Drake Manufacturing Company, Chicago 22, Ill.	586
Wilbur B. Driver Company, Newark 4, N. J.	156
+Dual Engineering Corporation, Chicago 22, Ill.	460
DuKane Corporation, St. Charles, Ill.	252
*Dumont Electric Corporation, New York 34, N. Y.	157
Allen B. DuMont Laboratories, Inc., Clifton, N. J.	158
*DX Radio Products Company, Inc., Chicago 47, Ill.	159
Dynavox Corporation, Long Island City 1, N. Y.	455
+Eagle Electronics, Inc., New York 13, N. Y.	558
+Eastern Electronics Corporation, New Haven, Conn.	363
+Eastern Transformer Company, Inc., New York 11, N. Y.	602
Hugh H. Eby, Inc., Philadelphia 44, Pa.	160
Eckstein Radio & Television Co., Minneapolis 6, Minn.	161
Eitel-McCullough, Inc., San Bruno, Calif.	162
*Elco Corporation, Philadelphia 40, Pa.	599
Electrical Reactance Corporation, Olean, N. Y.	163
+Electrical Reproduction Co., Chicago 22, Ill.	434
*Electrical Utilities Company, La Salle, Ill.	569
*Electrical Windings, Inc., Chicago 39, Ill.	682
*The Electrometric Co., Woodstock, Ill.	758
The Electro Motive Mfg. Co., Inc., Willimantic, Conn.	164
+Electronic Associates, Inc., Long Branch, N. J.	512
+Electronic Corp. of America, New York 11, N. Y.	165
+Electrovox Company, Inc., East Orange, N. J.	565
Electronic Components Corporation, Chicago 10, Ill.	515
Electronic Devices, Inc., Brooklyn 15, N. Y.	752
Electronic Enterprises, Inc., Newark 4, N. J.	545
*Electronic Expediters, Chicago 1, Ill.	755
Electronic Industries Inc., Springfield, Ohio	675
+Electronic Laboratories, Inc., Indianapolis, Ind.	167
Electronic Products Company, Mount Vernon, N. Y.	557
Electronics & Nucleonics, Inc., New York 1, N. Y.	763
+Electronic Specialty Co., Los Angeles 26, Calif.	169
+Electro-Tone Corporation, Hoboken, N. J.	477
Electronic Tube Corporation, Philadelphia 18, Pa.	170
Electro-Voice, Inc., Buchanan, Mich.	649
*El-Rad Manufacturing Co., Chicago 13, Ill.	632

COMPANY	CODE NO.
*Eltran Corporation, St. Anne, Ill.	603
Emerson Radio & Phonograph Corp., New York 11, N. Y.	171
Empire Coil Company, Inc., New Rochelle, N. Y.	452
+Engineering Services, Inc., Evansville 8, Ind.	601
Ensign Coil Company, Chicago 23, Ill.	172
Erca Tool Die & Stamping Co., Brooklyn 22, N. Y.	762
Erie Resistor Corporation, Erie, Pa.	173
Espey Manufacturing Co., Inc., New York 21, N. Y.	174
*Esquire Radio Corporation, Brooklyn 2, N. Y.	742
*Essex Electronics, Berkeley Heights, N. J.	425
*Essex Wire Corporation, Fort Wayne 6, Ind.	175
Fada Radio and Electric Co., Inc., Belleville, N. J.	176
John E. Fast & Company, Chicago 41, Ill.	178
Federal Telephone & Radio Corp., Clifton, N. J.	179
+Felt Products Mfg. Co., Chicago 7, Ill.	180
Fidelity Products Co., Inc., So. Orange, N. J.	494
Forbes & Wagner, Inc., Silver Creek, N. Y.	701
*The Formatic Company, Naugatuck, Conn.	735
*Foster Transformer Company, Cincinnati 23, Ohio	394
A. W. Franklin Mfg. Corp., Long Island City 1, N. Y.	182
+Franklin Photographic Industries, Chicago 10, Ill.	349
*Freed Radio Corporation, New York 13, N. Y.	183
Fretco Television Company, Pittsburgh 19, Pa.	734
+Finch Telecommunications Inc., Passaic, N. J.	181
+Fisher Radio Company, New York 17, N. Y.	456
L. H. Frost & Company, Grand Rapids 2, Mich.	746
*F. & V. Coil Winding Corporation, Newark 5, N. J.	572
+Billings S. Fuess, South Orange, N. J.	184
*Garod Radio Corporation, Brooklyn 1, N. Y.	186
*Gates Radio Company, Quincy, Ill.	187
*Gavitt Mfg. Co., Inc., Brookfield, Mass.	360
+Gem Phono Manufacturing Inc., New York 19, N. Y.	469
+General Aniline & Film Corporation, New York 17, N. Y.	458
+General Cable Corp., New York 17, N. Y.	571
General Cement Mfg. Co., Rockford, Ill.	396
General Ceramics and Steatite Corp., Keasbey, N. J.	685
*General Communication Company, Boston 15, Mass.	459
General Electric Company, Syracuse 1, N. Y.	188
+General Electronics, Inc., Paterson 3, N. J.	189
The General Industries Company, Elyria, Ohio	190
General Instrument Corporation, Elizabeth 3, N. J.	191
General Laminated Products, Inc., Chicago 8, Ill.	192
General Magnetic Corporation, Detroit 34, Mich.	193
+General Precision Equipment Corporation, New York 7, N. Y.	582
General Radio Company, Cambridge 39, Mass.	194
General Railway Signal Company, Rochester 2, N. Y.	644
+General Television & Radio Corporation, Chicago 51, Ill.	195
+General Transformer Corporation, Chicago 7, Ill.	412
General Vacuum Tube Corp., Ardsley, N. Y.	714
Gilner Manufacturing Company, Steger, Ill.	441
Gits Molding Corporation, Chicago 44, Ill.	196
Glaser-Steers Corporation, Belleville 9, N. J.	670
*Glass Products Company, Chicago 37, Ill.	475
The Fred Goat Co., Inc., Brooklyn 17, N. Y.	197
Good-All Electric Mfg. Co., Ogalalla, Nebraska	446
+Gralnick Bros, Inc., Philadelphia 22, Pa.	353
The Gramer Transformer Company, Chicago 39, Ill.	596
*Grand Transformers, Inc., Grand Haven, Mich.	757
Grayburne Corporation, New York 13, N. Y.	759
Grigsby-Allison Company, Inc., Arlington Heights, Ill.	467
The Gudeman Company, Chicago 10, Ill.	438
Edwin I. Guthman & Co., Inc., Chicago 7, Ill.	198
*The Halldorson Company, Chicago 40, Ill.	556
The Hallicrafters Co., Chicago 24, Ill.	199
Hammarlund Mfg. Co., Inc., New York 1, N. Y.	201
Hardwick, Hindle, Inc., Newark 5, N. J.	411
+Hartford Industries Inc., Jackson Heights, New York, N. Y.	361
Harnett Electric Corporation, Port Washington, N. Y.	481
+Harvey Radio Laboratories, Inc., Cambridge 38, Mass.	202
+Harvey-Wells Electronics Inc., Southbridge, Mass.	203
Hawley Products Company, St. Charles, Ill.	204
Haydu Brothers, Plainfield, N. J.	205
Hazeltine Electronics Corporation, Little Neck, Long Island, New, York	376
Hedco Manufacturing Corporation, Chicago 10, Ill.	535
*Heppner Manufacturing Company, Round Lake, Ill.	575
Herlec Corporation, Sub. of Sprague Electric Co., Milwaukee 3, Wis.	457
+Hewlett-Packard Company, Palo Alto, Calif.	206
The Hickok Electrical Instrument Co., Cleveland 8, Ohio	508
*Hillburn Electronic Products Co., Brooklyn 22, N. Y.	687
Hoffman Radio Corporation, Los Angeles 7, Calif.	207
John R. Hollingsworth Corporation, Clifton Heights, Pa.	659
+Holiday Specialties, Inc., New York 12, N. Y.	611
*Holyoke Wire and Cable Corporation, Holyoke, Mass.	372
*Homecraft Manufacturing Co., Newark 5, N. J.	728
+Houston Radio & Television Co., Houston, Texas	483
+Howard Radio Company, Chicago 13, Ill.	208
+Hudson American Corp., New York 18, N. Y.	209
*Hudson Electronics Corporation, Mount Vernon, N. Y.	487
Hughes Aircraft Company, Culver City, Calif.	744
Hytron Radio & Electronics Co. (Division of Columbia Broadcasting System, Inc.) Salem, Mass.	211
Illinois Condenser Co., Chicago 22, Ill.	616
The Indiana Steel Products Company, Chicago 2, Ill.	211
+Industrial and Commercial Electronics, Belmont, Calif.	212
Industrial Development Engineering Associates, Inc., Indianapolis 4, Indiana	638
+Industrial Electronic Corporation, Brooklyn 31, N. Y.	399
Industrial Television, Inc., Clifton, N. J.	541
+Industrial Synthetics Corporation, Irvington, N. J.	365
+International Detrola Corporation, Detroit 6, Mich.	213
+The International Electronics Company, Philadelphia 30, Pa.	578
International Resistance Company, Philadelphia 8, Pa.	214
Irvington Varnish & Insulator Co., Irvington 11, N. J.	215
Jackson Electrical Instrument Co., Dayton 1, Ohio	216
Jackson Industries, Inc., Chicago 15, Ill.	217
J-B-T Instruments, Inc., New Haven 8, Conn.	442
Jeffers Electronics, Inc., DuBois, Pa.	724
Jefferson Electric Company, Bellwood, Ill.	218
Jefferson-Travis Incorporated (Emerson Radio & Phonograph), New York 11, N. Y.	219
Jensen Manufacturing Company, Div. of the Muter Company, Chicago 38, Ill.	220
Jersey Specialty Co., Inc., Little Falls, N. Y.	730
*Jewel Radio Corporation, Long Island City 1, N. Y.	651
J. F. D. Manufacturing Co., Inc., Brooklyn 4, N. Y.	221
E. F. Johnson Company, Waseca, Minn.	222
Johnson & Hoffman Mfg. Co., Rockville Centre, N. Y.	639
*The Joyner Corporation, Chicago 44, Ill.	511
Kay Electric Company, Pine Brook, N. J.	620
Kerrigan Lewis Manufacturing Co., Chicago 51, Ill.	223
Kester Solder Company, Chicago 39, Ill.	224
Keystone Electronics Company, Stamford, Conn.	699
+Kimble Glass Div., Owens-Illinois Glass Co., Toledo, Ohio	229
+Kings Electronics Company, Brooklyn 5, N. Y.	470
King Laboratories, Inc., Syracuse 4, N. Y.	225
Kip Electronics Corporation, New York 14, N. Y.	593
The James Knights Company, Sandwich, Ill.	504
+Kobzy Tool Company, Chicago 22, Ill.	594
+Kuthe Laboratories, Inc., Newark, N. J.	226
+Kyle Corporation, South Milwaukee, Wis.	387
The La Pointe Plascamold Corp., Windsor Locks, Conn.	577
+Lear, Incorporated, Piqua, Ohio	227
+Lectrovision Inc., New Rochelle, N. Y.	486
+Lee Radio Manufacturing Corporation, New Hyde Park, N. Y.	421
Lenz Electric Manufacturing Co., Chicago 47, Ill.	228
*Leonard Electric Products Co., Inc., Brooklyn 32, N. Y.	570
Lewis & Kaufman, Inc., Los Gatos, Calif.	738
+Lewis Electronics, Los Gatos, Calif.	354
+Lewyt Corporation, Brooklyn 11, N. Y.	416
+Lincoln Electronics Corporation, New York 19, N. Y.	404
Littelfuse, Incorporated, Chicago 40, Ill.	230
Lowell Metal Products Corporation, St. Louis 7, Missouri	657
+Lyman Electronic Corp., Springfield 4, Mass.	559
Lytle Engineering & Mfg. Co., Chicago 25, Ill.	671
Machlett Laboratories, Incorporated, Springdale, Conn.	231
*Madisco, Inc., Philadelphia 24, Pa.	743
+Madison Electrical Products Corp., Madison, N. J.	346
The Magnavox Company, Fort Wayne 4, Ind.	232
+Magnetic Corp. of America, Chicago 22, Ill.	630
+Maguire Industries Incorporated, Greenwich, Conn.	233
+Majestic Radio & Television Corp., Chicago 32, Ill.	234
P. R. Mallory & Co., Inc., Indianapolis 6, Ind.	235
+E. W. McGrade Manufacturing Co., Kansas City 2, Missouri	426
Markel Electric Products, Inc., Buffalo 3, N. Y.	609
H. S. Martin & Company, Evanston, Ill.	686
J. A. Maurer, Inc., Long Island City 1, N. Y.	655
Measurements Corporation, Boonton, N. J.	236
+John Meck Industries, Inc., Plymouth, Indiana	237
+Meissner Mfg. Div., Maguire Industries Inc., Mt. Carmel, Ill.	238
+Mercury Equipment Company, Ashtabula, Ohio	408
*Merit Transformer Corporation, Chicago 40, Ill.	239
Methode Manufacturing Corp., Chicago 47, Ill.	720
Micamold Radio Corporation, Brooklyn 37, N. Y.	240
+Micarata Fabricators, Inc., Chicago 40, Ill.	506
+Micro Switch Division, First Industrial Corporation, Freeport, Ill.	241
*Mid-West Coil & Transformer Co., Chicago 14, Ill.	549
+Midwest Electric Products, Inc., Indianapolis 8, Ind.	410
+Mifflinburg Body Works, Inc., Mifflinburg, Pa.	622
James Millen Manufacturing Co., Inc., Malden 48, Mass.	242
Milwaukee Resistor Company, Milwaukee 4, Wis.	722
*Milwaukee Stamping Company, Milwaukee 14, Wis.	424
+Minerva Corporation of America, New York 7, N. Y.	243
*Mississippi Products, Inc., Jackson, Miss.	445
+Modern Electronic Company, Inc., New York 11, N. Y.	388
Mosley Electronics, Overland 14, Missouri	750
Motorola Inc., Chicago 51, Ill.	185
Multi-Tron Laboratory, Chicago 44, Ill.	693
The Muter Company, Chicago 5, Ill.	244
Mycalex Corporation of America, Clifton, N. J.	642
National Aeronautical Corporation, Ambler, Pa.	643
National Company, Inc., Malden 48, Mass.	245
+National Design Service, New York 6, N. Y.	389
*National Electronics, Inc., Geneva, Ill.	749
National Fabricated Products, Inc., Chicago 47, Ill.	246
National Moldite Company, Hillside 5, N. J.	367
National Union Radio Corporation, Orange, N. J.	247
The National Varnished Products Corp., Woodbridge, N. J.	479
+National Vulcanized Fibre Co., Wilmington, Del.	362

COMPANY	CODE NO.
+Newcomb Audio Products Company, Los Angeles 7, Calif.	437
New York Transformer Co., Inc., Alpha, N. J.	366
+The Nielsen Television Corporation, Norwalk, Conn.	543
+Noma Electric Corporation, New York 11, N. Y.	400
North American Philips Company, Inc., New York 17, N. Y.	423
Northern Metal Products Company, Chicago 24, Ill.	640
Northwest Plastics, Inc., St. Paul, Minn.	723
Oak Electronics Company, Buffalo 3, N. Y.	739
Oak Mfg. Co., Chicago 10, Ill.	249
The Ohio Carbon Company, Cleveland 11, Ohio	250
+Ohio Tool Company, Cleveland 11, Ohio	405
Ohmite Manufacturing Company, Chicago 44, Ill.	251
Olympic Metal Products Co., Inc., Phillipburg, N. J.	740
+Olympic Radio & Television, Inc., Long Island City 1, N. Y.	200
*The Orsenigo Co., Inc., Westerly, Rhode Island	625
Orsyd Company, Detroit 10, Mich.	656
Otis Radio & Electric Corp., Hawarden, Iowa	552
Oxford Electric Corporation, Chicago 15, Ill.	465
Oxford-Tartak Radio Corporation, Chicago 15, Ill.	253
Packard-Bell Company, Los Angeles 64, Calif.	254
+Packard Manufacturing Corporation, Indianapolis 7, Ind.	255
+Panelyte Division, St. Regis Paper Co., New York 17, N. Y.	256
Parisian Novelty Company, Chicago 9, Ill.	257
*Paul & Beekman, Inc., Philadelphia 40, Pa.	736
Penn Boiler & Burner Mfg. Corp., Lancaster, Pa.	676
Penn Television Products Company, Philadelphia 34, Pa.	726
Penn Tran Corporation, Bellefonte, Pa.	665
Perfection Electric Company, Chicago 16, Ill.	592
*Permaglass, Incorporated, Genoa, Ohio	754
Permoflux Corporation, Chicago 39, Ill.	258
*Permoflux Corporation, Glendale 5, Calif.	395
Permo, Incorporated, Chicago 26, Ill.	259
*Phalo Plastics Corporation, Worcester 8, Mass.	697
Philco Corporation, Philadelphia 34, Pa.	260
*Philharmonic Radio & Television Corp., New Brunswick, N. J.	261
Philmore Manufacturing Co., Inc., New York 3, N. Y.	262
+Phonovision Corporation, Chicago 22, Ill.	263
Pickering and Company, Inc., Oceanside, N. Y.	631
+Pierce Wire Recorder Corporation, Evanston, Ill.	279
Pilot Radio Corporation, Long Island City 1, N. Y.	264
Pioneer Electronics Corporation, Santa Monica, Calif.	706
*Planet Manufacturing Corporation, Bloomfield, N. J.	761
*Plastoid Corporation, Hamburg, N. J.	435
Polarad Electronics Corporation, Brooklyn 11, N. Y.	562
+Poray, Inc., Chicago 51, Ill.	265
Powdered Metal Products Corporation of America, Franklin Park, Ill.	539
Precision Apparatus Company, Inc., Elmhurst, Long Island, N. Y.	505
+Precision Parts Company, Ann Arbor, Mich.	471
+Precision Specialities, Los Angeles 4, Calif.	266
Premax Products Division, Chisholm-Ryder Co., Inc., Niagara Falls, N. Y.	267
+Premier Crystal Laboratories, Inc., New York 7, N. Y.	432
+R. Prescott & Son, Inc,, Keeseville, N. Y.	356
+Press Wireless Manufacturing Corporation, Long Island City, N. Y.	268
+Printloid Inc., New York 12, N. Y.	390
*Harry A. Prock Cabinet Company, Glenside, Pa.	374
Product Development Co., Inc., Arlington, N. J.	703
*Pyramid Electric Company, North Bergen, N. J.	472
*Q. L. C. Corporation, Summit, N. J.	464
+Quakertown Luggage Company, Philadelphia 47, Pa.	443
+Quality Hardware and Machine Corporation, Chicago 26, Ill.	269
Quam-Nichols Company, Chicago 16, Ill.	270
Rada Products Co., Chicago 12, Ill.	482
+Radell Corporation, Indianapolis 5, Ind.	271
+Radex Corporation, Chicago 22, Ill.	272
+Radiation Products, Inc., Los Angeles 15, Calif.	414
Radio Apparatus Corporation, Indianapolis 4, Ind.	702
Radio Condenser Company, Camden 3, N. J.	273
Radio Corporation of America, RCA Victor Division, Camden, N. J.	274
The Radio Craftsmen, Inc., Chicago 16, Ill.	275
*Radio Development & Research Corp., Jersey City, N. J.	419
Radio Engineering Laboratories, Inc., Long Island City, New York	276
*Radio Industries, Inc., Chicago 40, Ill.	540
*Radiomarine Corporation of America, New York 13, N. Y.	448
+Radio Mfg. Engineers, Inc., Peoria 6, Ill.	498
Radio Materials Corporation, Chicago 18, Ill.	732
+Radio Merchandise Sales, Inc., New York 55, N. Y.	612
+Radio Navigational Instrument Corp., New York 21, N. Y.	407
The Radion Corporation, Chicago 22, Ill.	700
*Radionic Controls, Inc., Herrin, Ill.	447
+Radio Receptor Company, Inc., New York 11, N. Y.	380
+Radio Speakers, Inc., Chicago 16, Ill.	277
Radio Specialty Manufacturing Co., Portland 14, Oregon	587
*Radio Television Products Corp., Grass Lake, Mich.	489
RAM Electronics, Inc., Irvington-on-Hudson, N. Y.	617
+Rayenergy Radio & Television Corp. of America, New York, N. Y.	348
Raytheon Manufacturing Company, Newton 58, Mass.	280
Rea Magnet Wire Company, Inc., Fort Wayne 4, Ind.	281
*Red Lion Cabinet Company, Red Lion, Pa.	384
Redmond Company, Inc., Owosso, Mich.	753

COMPANY	CODE NO.
*Regal Electronics Corporation, New York 27, N. Y.	373
Rek-O-Kut Company, Inc., Long Island City 1, N. Y.	282
+R. K. L. Electro Winding Corp., Delevan, N. Y.	646
Remington Rand Inc., South Norwalk, Conn.	283
Remler Company, Ltd., San Francisco 10, Calif.	284
+Reynolds Metals Company, Louisville, Ky.	615
Rhode Island Insulated Wire Co., Inc., Cranston, R. I.	678
*Reider Bros., Philadelphia 34, Pa.	727
*Rockwell Transformer Co., Div. of Arrow Engineering Corp. Chicago 31, Ill.	716
The Rodefer Glass Company, Bellaire, Ohio	709
The Rola Company, Inc. (The Muter Company), Cleveland 14, Ohio	285
*Rollan Electric Co., Chicago 19, Ill.	721
The Ross Manufacturing Company, Burlington, Iowa	286
Rowe Industries, Toledo 9, Ohio	580
+Russell Electric Company, Chicago 10. Ill.	453
*Russell Speaker, Chicago 29, Ill.	748
*Sampsel Time Control, Inc., Spring Valley, Ill.	711
*Sampson Electric Products Co., Clinton, N. C.	518
Sangamo Electric Company, Springfield, Ill.	658
+Santay Corporation, Chicago 24, Ill.	368
+Sarkes Tarzian, Inc., Bloomfield, Indiana	684
+Scharr Electric Co., West Hartford, Conn.	652
+Schrader Electronic & Coil Corp., Los Angeles 11, Calif.	420
+Scholmerich Electronics, Inc., Sellersville, Pa.	428
+Screenmakers, Inc., New York 7, N. Y.	288
Schneider & Marquard, Inc., Brooklyn 17, N. Y.	520
Walter L. Schott Company, Los Angeles 18, Calif.	287
*Scott Radio Laboratories, Inc., Chicago 40, Ill.	485
J. P. Seeburg Corporation, Chicago 22, Ill.	289
+Selenium Corporation of America, Los Angeles 15, Calif.	290
Sentinel Radio Corporation, Evanston, Ill.	291
Sheffco Manufacturing Co., Palisades Park, N. J.	698
Sheldon Electric Company, Div. of Allied Electric Products, Inc., Irvington 11, N. J.	636
+Sheridan Electronics Corporation, Chicago 16, Ill.	292
Sherron Electronics Company, Div. of Sherron Metallic Corp., Brooklyn 6, N. Y.	293
Shoup Engineering Company, Chicago 16, Ill.	674
Shure Brothers, Incorporated, Chicago 10, Ill.	590
Shurite Meters (J-B-T Instruments, Inc.), New Haven 8, Conn.	484
F. W. Sickles Division, Sub. of General Instrument Corp., Chicopee, Mass.	294
+The Sillcocks-Miller Company, South Orange, N. J.	364
Simpson Electric Company, Chicago 44, Ill.	614
*Mark Simpson Manufacturing Co., Inc., Long Island City 3, N. Y.	295
*A. F. Smuckler & Co., Inc., Brooklyn 1, N. Y.	444
*Solar Manufacturing Corporation, Los Angeles 58, Calif.	296
*Sonora Radio & Television Corp., Chicago 12, Ill.	297
+Sound, Inc., Chicago 16, Ill.	298
*Sparton Radio-Television Division, The Sparks Withington Company, Jackson, Mich.	299
+Speaker Corporation of Chicago, Chicago 22, Ill.	499
Special Products Company, Silver Spring, Md.	474
*Special Products Division (Essex Wire Corp.), Chicago 41, Ill.	751
Speer Resistor Corporation, Saint Marys, Pa.	300
*Sperti Faraday Inc., Cincinnati 2, Ohio	302
+Sperry Gyroscope Co., Div. of the Sperry Co,, Great Neck, Long Island, N. Y.	301
Sprague Electric Company, North Adams, Mass.	303
Square Root Manufacturing Corporation, Yonkers 3, N. Y.	654
Stackpole Carbon Company, St. Marys 3, Pa.	304
*Stamford Transformers, Inc., Stamford, Conn.	398
*Standard Coil Products Co., Inc., Chicago 39, Ill.	305
*Standard Condenser Company, Chicago 47, Ill.	710
*Standard Electrical Products Co., Dayton 3, Ohio	668
Standard Electronics Corporation, New York 18, N. Y.	694
Standard Piezo Company, Carlisle, Pa.	501
Standard Transformer Corporation, Chicago 18, Ill.	306
*Standard Winding Company, Newburgh, N. Y.	550
+Stanley Spring Mfg., Co., Chicago 12, Ill.	605
*Stanwyck Winding Company, Newburgh, N. Y.	574
+Star Products Company, Chicago 10, Ill.	613
+Stark Sound Engineering Corporation, Fort Wayne, Ind.	560
The Staver Company Incorporated, Brooklyn 1, N. Y.	604
+Stephens Mfg. Corporation, Culver City, Calif.	544
Stevens Wire Insulating Company, Chicago 30, Ill.	597
Stewart-Warner Electric, Div. of Stewart-Warner Corp., Chicago 14, Ill.	307
*Stoddart Aircraft Radio Co., Hollywood 38, Calif.	369
Stromberg-Carlson Company, Rochester 3, N. Y.	308
Stupakoff Ceramic & Mfg. Co., Latrobe, Pa.	309
+Super Electric Products Corp. , Jersey City, N. J.	403
Superior Tube Company, Norristown, Pa.	310
Supreme, Incorporated, Greenwood, Miss.	311
Surprenant Mfg. Co., Boston 8, Mass.	624
Sylvania Electric Products Inc., Emporium, Pa.	312
Symphonic Radio and Electronic Corp., Cambridge 42, Mass.	351
Synthane Corporation, Oaks, Pa.	313
+Syracuse Ornamental Company, Syracuse 2, N. Y.	314
Talk-A-Phone Co., Chicago 23, Ill.	132
Taylor Tubes, Inc., Chicago 47, Ill.	713
*Tech-Master Products Company, New York 13, N. Y.	679
Technical Appliance Corporation, Sherburne, N. Y.	737

COMPANY	CODE NO.
+Technical Radio Company, San Francisco 3, Calif.	315
Technology Instrument Corporation, Acton, Mass.	715
+Telicon Corporation, New York 21, N. Y.	316
Tele King Corporation, New York 1, N. Y.	583
Telequip Radio Company, Chicago 8, Ill.	454
*Teleradio Engineering Corporation, Wilkes Barre, Pa.	357
Tele-Tone Radio Corporation, Elizabeth 2, N. J.	347
Tel-Instrument Co., Inc., East Rutherford, New Jersey	536
*TELvision Laboratories, Inc., Chicago 44, Ill.	608
+Television Projects, Inc., Newark 2, N. J.	566
*Temple Manufacturing Company, Chicago 26, Ill.	745
+Templetone Radio Mfg. Corporation, New London, Conn.	317
+Testing Instruments, Inc., Dayton 2, Ohio	463
*Thomas & Skinner Steel Products Co., Indianapolis 7, Ind.	318
Thomas Electronics, Inc., Passaic, N. J.	672
*Thordarson-Meissner Manufacturing Division, Maguire Industries, Inc., Mt. Carmel, Ill.	238
*Todd Products Co., Inc., Mt. Vernon, N. Y.	634
*Todd-Tran Corp., Mt. Vernon, N. Y.	635
*B. J. Toegel, Inc., Plainfield, N. J.	548
+Tone Products Corp. of America, New York 10, N. Y.	417
Trad Television Corporation, Asbury Park, N. J.	688
+Transmitter Equipment Mfg. Co., Inc., New York 14, N. Y.	523
Trav-Ler Radio Corporation, Chicago 6, Ill.	320
Triplett Electrical Instrument Co., Bluffton, Ohio	321
Triwec Transformer Company, Chicago 18, Ill.	524
Tung-Sol Electric Inc., Newark 4, N. J.	322
The Turner Company, Cedar Rapids, Iowa	696
*The Ucinite Company, Newtonville, Mass.	381
*TV Products Corporation, Paterson 3, N. J.	618
*United-Carr Fastener Corporation, Cambridge 42, Mass.	370
United Condenser Corporation, New York 54, N. Y.	516
United Electronics Company, Newark 2, N. J.	323
*United States Radium Corporation, New York 7, N. Y.	324
+United States Television Mfg. Corp., New York 23, N. Y.	325
*United Transformer Corporation, New York 13, N. Y.	418
+United Mfg. & Service Co., Milwaukee 2, Wis.	415
+United Speakers, Inc., Los Angeles 23, Calif.	473
+United Wood Specialty Mfg. Co., Fall River, Mass.	379
Universal Company, High Point, N. C.	756
+Universal Microphone Company, Inglewood, Calif.	326
+Universal Television System, Kansas City 8, Missouri	327
Utah Radio Products Co., Inc., Huntington, Ind.	328
Valpey Crystal Corporation, Holliston, Mass.	527
+Vertrod Corporation, New York 17, N. Y.	451
+Viewtone Television & Radio Corp., Brooklyn 1, N. Y.	329
Vokar Corporation, Dexter, Mich.	168
John Volkert Metal Stampings Inc., Queens Village, Long Island, N. Y.	507
*Waldom Electronics, Inc., Chicago 10, Ill.	555
Wm. T. Wallace Mfg. Co., Inc., Peru, Ind.	330
*Ward Leonard Electric Co., Mount Vernon, N. Y.	532
Ward Products Corporation, Division of the Gabriel Co., Cleveland 3, Ohio	331
*Warwick Manufacturing Corporation, Chicago 44, Ill.	332
Waterman Products Company, Inc., Philadelphia 25, Pa.	431
+Waters Conley Company, Rochester, Minn.	382
+Watterson Radio Manufacturing Corp., Dallas 1, Texas	333
*Webster-Chicago Corporation, Chicago 39, Ill.	375
+Webster Electric Company, Racine, Wis.	359
Weller Electric Corporation, Easton, Pa.	662
+Wellmann Manufacturing Company, Los, Angeles 46, Calif.	401
Wells-Gardner & Co., Chicago 39, Ill.	334
Wm. H. Welsh Co., Inc., Chicago 16, Ill.	335
*Wesco Electric Company Inc., Chicago 30, Ill.	553
Western Electric Company, Inc., New York 5, N. Y.	336
+Western Gasket & Packing Company, Los Angeles 11, Calif.	393
Westinghouse Electric Corporation, Baltimore 3, Md.	337
Weston Electrical Instrument Corp., Newark 5, N. J.	338
*The Wheeler Insulated Wire Company, Inc., Waterbury 20, Conn.	392
Wheeler Laboratories, Inc., Great Neck, N. Y.	529
The Whitney Blake Company, New Haven 14, Conn.	741
*Wilcox Electric Company, Inc., Kansas City 1, Missouri	339
+Wilcox-Gay Corporation, Charlotte, Mich.	340
Wilder Manufacturing Corp., Herrin, Ill.	449
+Wilmak Corporation, Benton Harbor, Mich.	383
Wind Turbine Company, West Chester, Pa.	653
Winsted Division, Hudson Wire Company, Winsted, Conn.	666
+Winters & Crampton Corporation, Grandville, Mich.	341
Wirt Company, Philadelphia 44, Pa.	406
W. M. C. Inc., Chicago 47, Ill.	584
Woodward-Schumacher Electric Corp., Chicago 22, Ill.	606
The Workshop Associates Incorporated, Needham Heights 94, Mass.	397
Wright Zimmerman, Inc., New Brighton, Minn.	683
+The Zell Company, New York 12, N. Y.	342
*Zenith Optical Company, Huntington 19, W. Va.	621
Zenith Radio Corporation, Chicago 39, Ill.	343
+Videon Electronic Corporation, Indianapolis 4, Ind.	765

NUMERICAL LIST

RTMA Production Source Code Symbols

January 1, 1952

(* Indicates non-members) (+ Not Listed in RTMA Listing of January 1, 1952)

CODE NO.	COMPANY
101	*Admiral Corporation, Chicago 47, Ill.
102	Aerovox Corporation, New Bedford, Mass.
103	+Airadio, Incorporated, Stamford, Conn.
104	+Aireon Manufacturing Corporation, Kansas City 15, Kan.
105	CBS-Columbia, Inc. (Sub. of Hytron Radio & Electronics Co.) Brooklyn 32, N. Y.
106	Allen-Bradley Company, Milwaukee 4, Wis.
107	The Alliance Manufacturing Co., Alliance, Ohio
108	+American Coil & Engineering Co., Chicago 22, Ill.
109	American Condenser Company, Chicago 40, Ill.
110	All Star Products, Inc., Defiance, Ohio
111	Amperex Electronic Corporation, Brooklyn 1, N. Y.
112	Amy, Aceves & King, Inc., New York 18, N. Y.
113	Andrea Radio Corporation, Long Island City 1, N. Y.
114	+Ansley Radio Corporation, Long Island City 1, N. Y.
115	A. R. F. Products, Inc., River Forest, Ill.
116	The Arnold Engineering Company, Sub. of Allegheny Ludlum Steel Corp., Marengo, Ill.
117	+Arpin Manufacturing Co., Orange, N. J.
118	+The Audio-Tone Oscillator Co., Bridgeport, Conn.
119	Automatic Manufacturing Corp., Newark 4, N. J.
120	Automatic Radio Mfg. Co., Inc., Boston 15, Mass.
121	+Bank's Manufacturing Company, Chicago 40, Ill.
122	The Bead Chain Manufacturing Co., Bridgeport 5, Conn.
123	+Bell & Howell Company, Chicago 45, Ill.
124	Belmont Radio Corporation, (Raytheon Manufacturing Co.) Chicago 39, Ill.
125	Bendix Radio, Division of Bendix Aviation Corporation, Baltimore 4, Md.
126	Bentley, Harris Manufacturing Co., Conshohocken, Pa.
127	+The Benwood Linze Company, St. Louis 3, Missouri
128	Bliley Electric Company, Erie, Pa.
129	+Boonton Radio Corporation, Boonton, New Jersey
130	The William Brand and Co., Inc., Willimantic, Conn.
131	+Browning Laboratories, Inc., Winchester, Mass.
132	Talk-A-Phone Co., Chicago 23, Ill.
133	C. F. Cannon Co., Springwater, N. Y.
134	Centralab, Div. of Globe-Union Inc., Milwaukee 1, Wis.
135	Chicago Condenser Corporation, Chicago 47, Ill.
136	Chicago Molded Products Corp., Chicago 51, Ill.
137	Chicago Telephone Supply Corp., Elkhart, Ind.
138	Chicago Transformer Div. Essex Wire Corporation, Chicago 18, Ill.
139	Cinch Manufacturing Corporation, Chicago 24, Ill.
140	Clarostat Mfg. Co., Inc., Dover, New Hampshire
141	*Coil Engineering & Mfg. Co., Inc., Roanoke, Ind.
142	+Colonial Radio Corporation, Buffalo 7, New York
143	+Communication Equip. & Engineering Co., Chicago 44, Ill.
144	+C. G. Conn Ltd., Federal Recorder Co., Elkhart, Ind.
145	*Consolidated Radio Products Co., Chicago 10, Ill.
146	Continental Carbon Inc., Cleveland 11, Ohio
147	Continental Electric Company, Geneva, Ill.
148	Corning Glass Works, Corning, N. Y.
149	Cornish Wire Company, Inc., New York 7, N. Y.
150	Crescent Industries, Inc., Chicago 31, Ill.
151	Croname, Incorporated, Chicago 13, Ill.
152	Crosley Division, Avco Manufacturing Corporation, Cincinnati 25, Ohio
153	+Crystal Research Laboratories, Inc., Hartford 3, Conn.
154	*Tobe Deutschmann Corporation, Norwood, Mass.
155	DeWald Radio Mfg. Corp., Long Island City 1, N. Y.
156	Wilbur B. Driver Company, Newark 4, N. J.
157	*Dumont Electric Corporation, New York 34, N. Y.
158	Allen B. DuMont Laboratories, Inc., Clifton, N. J.
159	*DX Radio Products Company, Inc., Chicago 47, Ill.
160	Hugh H. Eby, Inc., Philadelphia 44, Pa.
161	Eckstein Radio & Television Co., Minneapolis 6, Minn.
162	Eitel-McCullough, Inc., San Bruno, Calif.
163	Electrical Reactance Corporation, Olean, N. Y.
164	The Electro Motive Mfg. Co., Inc., Willimantic, Conn.
165	+Electronic Corp. of America, New York 11, N. Y.
166	*Chicago Electronic Engineering Company, Inc., Chicago 47, Ill.
167	+Electronic Laboratories, Incorporated, Indianapolis, Ind.
168	Vokar Corporation, Dexter, Michigan
169	+Electronic Specialty Co., Los Angeles 26, Calif.
170	Electronic Tube Corporation, Philadelphia 18, Pa.
171	Emerson Radio & Phonograph Corp., New York 11, N. Y.

CODE NO.	COMPANY
172	Ensign Coil Company, Chicago 23, Ill.
173	Erie Resistor Corporation, Erie, Pa.
174	Espey Manufacturing Company, Inc., New York 21, N. Y.
175	*Essex Wire Corporation, Fort Wayne 6, Ind.
176	Fada Radio and Electric Co., Inc., Belleville, N. J.
177	Capehart-Farnsworth Corporation, Fort Wayne 1, Ind.
178	John E. Fast & Company, Chicago 41, Ill.
179	Federal Telephone & Radio Corp., Clifton, N. J.
180	+Felt Products Mfg. Co., Chicago 7, Ill.
181	+Finch Telecommunications, Inc., Passaic, N. J.
182	A. W. Franklin Mfg. Corp., Long Island City 1, N. Y.
183	*Freed Radio Corporation, New York 13, N. Y.
184	+Billings S. Fuess, South Orange, N. J.
185	Motorola Inc., Chicago 51, Ill.
186	+Garod Radio Corporation, Brooklyn 1, N. Y.
187	*Gates Radio Company, Quincy, Ill.
188	General Electric Company, Syracuse 1, N. Y.
189	+General Electronics, Inc., Paterson 3, N. J.
190	The General Industries Company, Elyria, Ohio
191	General Instrument Corporation, Elizabeth 3, N. J.
192	General Laminated Products, Inc., Chicago 8, Ill.
193	General Magnetic Corporation, Detroit 34, Mich.
194	General Radio Company, Cambridge 39, Mass.
195	+General Television & Radio Corporation, Chicago 51, Ill.
196	Gits Molding Corporation, Chicago 44, Ill.
197	The Fred Goat Co., Inc., Brooklyn 17, N. Y.
198	Edwin I. Guthman & Company, Inc., Chicago 7, Ill.
199	The Hallicrafters Company, Chicago 24, Ill.
200	+Olympic Radio & Television, Inc., Long Island City 1, N. Y.
201	+Hammarlund Mfd., Co. Inc., New York 1, N. Y.
202	+Harvey Radio Laboratories, Inc., Cambridge 38, Mass.
203	+Harvey-Wells Electronics Inc., Southbridge, Mass.
204	Hawley Products Company, St. Charles, Ill.
205	Haydu Brothers, Plainfield, N. J.
206	+Hewlett-Packard Company, Palo Alto, Calif.
207	Hoffman Radio Corporation, Los Angeles 7, Calif.
208	+Howard Radio Company, Chicago 13, Ill.
209	+Hudson American Corp., New York 18, N. Y.
210	Hytron Radio & Electronics Co. (Div. of Columbia Broadcasting System, Inc.), Salem, Mass.
211	The Indiana Steel Products Company, Chicago 2, Ill.
212	+Industrial and Commercial Electronics, Belmont, Calif.
213	+International Detrola Corporation, Detroit 6, Mich.
214	International Resistance Company, Philadelphia 8, Pa.
215	Irvington Varnish & Insulator Co., Irvington 11, N. J.
216	Jackson Electrical Instrument Co., Dayton 1, Ohio
217	Jackson Industries, Inc., Chicago 15, Ill.
218	Jefferson Electric Company, Bellwood, Ill.
219	Jefferson-Travis Incorporated (Emerson Radio & Phonograph Corp.) New York 11, N. Y.
220	Jensen Manufacturing Company, Div. of The Muter Company, Chicago 38, Ill.
221	J. F. D. Manufacturing Co., Inc., Brooklyn 4, N. Y.
222	E. F. Johnson Company, Waseca, Minn.
223	Kerrigan Lewis Manufacturing Co., Chicago 51, Ill.
224	Kester Solder Company, Chicago 39, Ill.
225	King Laboratories, Inc., Syracuse 4, N. Y.
226	+Kuthe Laboratories, Inc., Newark, N. J.
227	+Lear, Incorporated, Piqua, Ohio
228	Lenz Electric Manufacturing Co., Chicago 47, Ill.
229	+Kimble Glass Div., Owens-Illinois Glass Co., Toledo 1, Ohio
230	Littelfuse, Incorporated, Chicago 40, Ill.
231	Machlett Laboratories, Incorporated, Springdale, Conn.
232	The Magnavox Company, Fort Wayne 4, Ind.
233	+Maguire Industries Incorporated, Greenwich, Conn.
234	+Majestic Radio & Television Corp., Chicago 32, Ill.
235	P. R. Mallory & Co., Inc., Indianapolis 6, Ind.
236	Measurements Corporation, Boonton, N. J.
237	+John Meck Industries, Inc., Plymouth, Indiana
238	+Meissner Mfg. Div., Maguire Industries Inc., Mt. Carmel, Ill.
239	*Merit Transformer Corp., Chicago 40, Ill.
240	Micamold Radio Corporation, Brooklyn 37, N. Y.
241	+Micro Switch Div., First Industrial Corporation, Freeport, Ill.
242	James Millen Manufacturing Co., Inc., Malden 48, Mass.
243	+Minerva Corporation of America, New York 7, N. Y.
244	The Muter Company, Chicago 5, Ill.
245	National Company, Inc., Malden 48, Mass.
246	National Fabricated Products, Inc., Chicago 47, Ill.
247	National Union Radio Corporation, Orange, N. J.
248	Arvin Industries, Inc., Columbus, Ind.
249	Oak Mfg. Co., Chicago 10, Ill.
250	The Ohio Carbon Company, Cleveland 11, Ohio
251	Ohmite Manufacturing Company, Chicago 44, Ill.
252	DuKane Corporation, St. Charles, Ill.
253	+Oxford-Tartak Radio Corporation, Chicago 15, Ill.
254	Packard-Bell Company, Los Angeles 64, Calif.
255	+Packard Manufacturing Corporation, Indianapolis 7, Ind.
256	+Panelyte Div., St. Regis Paper Co., New York 17, N. Y.
257	Parisian Novelty Company, Chicago 9, Ill.
258	Permoflux Corporation, Chicago 39, Ill.
259	Permo, Incorporated, Chicago 26, Ill.
260	Philco Corporation, Philadelphia 34, Pa.
261	+Philharmonic Radio Corporation, New York 21, N. Y.
262	Philmore Manufacturing Co., Inc., New York 3, N. Y.
263	+Phonovision Corporation, Chicago 22, Ill.
264	Pilot Radio Corporation, Long Island City 1, N. Y.
265	+Poray, Inc., Chicago 51, Ill.
266	+Precision Specialities, Los Angeles 4, Calif.
267	Premax Products Div., Chisholm-Ryder Co., Inc., Niagara Falls, N. Y.
268	+Press Wireless Manufacturing Corporation, Long Island City, N. Y.
269	+Quality Hardware and Machine Corporation, Chicago 28, Ill.
270	Quam-Nichols Company, Chicago 16, Ill.
271	+Radell Corporation, Indianapolis 5, Ind.
272	+Radex Corporation, Chicago 22, Ill.
273	Radio Condenser Company, Camden 3, N. J.
274	Radio Corporation of America, RCA Victor Div., Camden, N. J.
275	The Radio Craftsmen, Inc., Chicago 16, Ill.
276	Radio Engineering Laboratories, Inc., Long Island City 1, N. Y.
277	+Radio Speakers, Inc., Chicago 16, Ill.
278	Brunswick Div. of Radio & Television, Inc., New York 19, N. Y.
279	+Pierce Wire Recorder Corporation, Evanston, Ill.
280	Raytheon Manufacturing Company, Newton 58, Mass.
281	Rea Magnet Wire Company, Inc., Fort Wayne 4, Ind.
282	Rek-O-Kut Company, Inc., Long Island City 1, N J.
283	Remington Rand Inc., South Norwalk, Conn.
284	Remler Company, Ltd., San Francisco 10, Calif.
285	The Rola Company, Inc. (The Muter Company), Cleveland 14, Ohio
286	The Ross Manufacturing Company, Burlington, Iowa
287	Walter L. Schott Company, Los Angeles 18, Calif.
288	Screenmakers, Inc., New York 7, N. Y.
289	J. P. Seeburg Corporation, Chicago 22, Ill.
290	+Selenium Corporation of America, Los Angeles 15, Calif.
291	Sentinel Radio Corporation, Evanston, Ill.
292	+Sheridan Electronics Corporation, Chicago 16, Ill.
293	Sherron Electronics Company, Div. of Sherron Metallic Corp., Brooklyn 6, N. Y.
294	F. W. Sickles Div., Sub. of General Instrument Corp., Chicopee, Mass.
295	*Mark Simpson Manufacturing Co., Inc., Long Island City 3, N. Y.
296	*Solar Manufacturing Corporation, Los Angeles 58, Calif.
297	*Sonora Radio & Television Corp., Chicago 12, Ill.
298	+Sound, Inc., Chicago 16, Ill.
299	*Sparton Radio-Television Division, The Sparks Withington Company, Jackson, Mich.
300	Speer Resistor Corporation, Saint Marys, Pa.
301	+Sperry Gyroscope Co., Div. of the Sperry Co., Great Neck, Long Island, N. Y.
302	+Sperti, Inc., Norwood 12, Cincinnati, Ohio
303	Sprague Electric Company, North Adams, Mass.
304	Stackpole Carbon Company, St. Marys 3, Pa.
305	*Standard Coil Products Co., Inc., Chicago 39, Ill.
306	Standard Transformer Corporation, Chicago 18, Ill.
307	Stewart-Warner Electric, Div. of Stewart-Warner Corporation, Chicago 14, Ill.
308	Stromberg-Carlson Company, Rochester 3, N. Y.
309	Stupakoff Ceramic & Mfg. Co., Latrobe, Pa.
310	Superior Tube Company, Norristown, Pa.
311	Supreme, Incorporated, Greenwood, Miss.
312	Sylvania Electric Products Inc., Emporium, Pa.
313	Synthane Corporation, Oaks, Pa.
314	+Syracuse Ornamental Company, Syracuse 2, N. Y.
315	+Technical Radio Company, San Francisco 3, Calif.
316	+Telicon Corporation, New York 21, N. Y.
317	+Templetone Radio Mfg. Corporation, New London, Conn.
318	*Thomas & Skinner Steel Products Co., Indianapolis, Ind.
319	+Thordarson Electric Mfg., Div. Maguire Industries, Inc., Chicago 10, Ill.
320	Trav-Ler Radio Corporation, Chicago 6, Ill.
321	Triplett Electrical Instrument Co., Bluffton, Ohio
322	Tung-Sol Electric Inc., Newark 4, N. J.
323	United Electronics Company, Newark 2, N. J.
324	*United States Radium Corporation, New York 7, N. Y.
325	+United States Television Mfg. Corp., New York 23, N. Y.
326	+Universal Microphone Company, Inglewood, Calif.
327	+Universal Television System, Kansas City 8, Missouri
328	+Utah Radio Products Company, Detroit 9, Mich.
329	+Viewtone Television & Radio Corp., Brooklyn 1, N. Y.
330	Wm. T. Wallace Mfg. Co., Inc., Peru, Ind.
331	Ward Products Corporation, Div. of the Gabriel Company, Cleveland 3, Ohio
332	*Warwick Manufacturing Corporation, Chicago 44, Ill.
333	+Watterson Radio Manufacturing Corp., Dallas 1, Texas
334	Wells-Gardner & Co., Chicago 39, Ill.
335	Wm. H. Welsh Co., Inc., Chicago 16, Ill.
336	Western Electric Company, Inc., New York 5, N. Y.
337	Westinghouse Electric Corporation, Baltimore 3, Md.
338	Weston Electrical Instrument Corp., Newark 5, N. J.
339	+Wilcox Electric Company, Inc., Kansas City 1, Mo.
340	+Wilcox-Gay Corporation, Charlotte, Mich.
341	+Winters & Crampton Corporation, Grandville, Mich.
342	+The Zell Company, New York 12, N. Y.
343	Zenith Radio Corporation, Chicago 39, Ill.
344	+Argus, Incorporated, Ann Arbor, Mich.
345	The Astatic Corporation, Conneaut, Ohio
346	+Madison Electrical Products Corp., Madison, N. J.
347	Tele-Tone Radio Corporation, Elizabeth 2, N. J.
348	+Rayenergy Radio & Television Corp. of America, New York, N. Y.
349	+Franklin Photographic Industries, Chicago 10, Ill.
350	+American Transformer Co., Newark 5, N. J.

CODE NO.	COMPANY
351	Symphonic Radio and Electronic Corp., Cambridge 42, Mass.
352	+Magnetic Windings Company, Easton, Pa.
353	+Gralnick Bros, Inc., Philadelphia 22, Pa.
354	+Lewis Electronics, Los Gatos, Calif.
355	+Boonton Molding Company, Boonton, N. J.
356	+R. Prescott & Son, Inc., Keeseville, N. Y.
357	*Teleradio Engineering Corporation, Wilkes Barre, Pa.
358	+Cinaudagraph Div., Indiana Steel Products Co., Stamford, Conn.
359	+Webster Electric Company. Racine, Wis.
360	*Gavitt Mfg. Co., Inc., Brookfield, Mass.
361	+Hartford Industries Inc., Jackson Heights, New York, N. Y.
362	+National Vulcanized Fibre Co., Wilmington, Del.
363	+Eastern Electronics Corporation, New Haven, Conn.
364	+The Sillcocks-Miller Company, South Orange, N. J.
365	+Industrial Synthetics Corporation, Irvington, N. J.
366	New York Transformer Co., Inc., Alpha, N. J.
367	National Moldite Company, Hillside 5, N. J.
368	+Santay Corporation, Chicago 24, Ill.
369	*Stoddart Aircraft Radio Co., Hollywood 38, Calif.
370	*United-Carr Fastener Corporation, Cambridge 42, Mass.
371	*Best Manufacturing Co., Inc., Irvington 11, N. J.
372	*Holyoke Wire and Cable Corporation, Holyoke, Mass.
373	*Regal Electronics Corporation, New York 27, N. Y.
374	*Harry A. Prock Cabinet Company, Glenside, Pa.
375	*Webster-Chicago Corporation, Chicago 39, Ill.
376	Hazeltine Electronics Corporation, Little Neck, L. I., N. Y.
377	+DeMornay-Budd, Incorporated, New York 51, N. Y.
378	+Bachmann Bros. Inc., Philadelphia 24, Pa.
379	+United Wood Specialty Mfg. Co., Fall River, Mass.
380	+Radio Receptor Company, Inc., New York 11, N. Y.
381	*The Ucinite Company, Newtonville, Mass.
382	+Waters Conley Company, Rochester, Minn.
383	+Wilmak Corporation, Benton Harbor, Mich.
384	*Red Lion Cabinet Company, Red Lion, Pa.
385	*Dearborn Glass Company, Chicago 8, Ill.
386	+Arpee Products Co., Glendale, Calif.
387	+Kyle Corporation, South Milwaukee, Wis.
388	+Modern Electronic Company, Inc., New York 11, N. Y.
389	+National Design Service, New York 6, N. Y.
390	+Printloid Inc., New York 12, N. Y.
391	Altec Lansing Corporation, Beverly Hills, Calif.
392	*The Wheeler Insulated Wire Company, Inc., Waterbury 20, Conn.
393	+Western Gasket & Packing Company, Los Angeles 11, Calif.
394	*Foster Transformer Company, Cincinnati 23, Ohio
395	*Permoflux Corporation, Glendale 5, Calif.
396	General Cement Mfg. Co., Rockford, Ill.
397	The Workshop Associates Inc., Needham Heights 94, Mass.
398	*Stamford Transformers, Inc., Stamford, Conn.
399	+Industrial Electronic Corporation, Brooklyn 31, N. Y.
400	+Noma Electric Corporation, New York 11, N. Y.
401	+Wellmann Manufacturing Company, Los Angeles 46, Calif.
402	Andrew Corporation, Chicago 19, Ill.
403	+Super Electric Products Corp., Jersey City, N. J.
404	+Lincoln Electronics Corporation, New York 19, N. Y.
405	+Ohio Tool Company, Cleveland 11, Ohio
406	Wirt Company, Philadelphia 44, Pa.
407	+Radio Navigational Instrument Corp., New York 21, N. Y.
408	+Mercury Equipment Company, Ashtabula, Ohio
409	British Industries Corporation, New York 13, N. Y.
410	+Midwest Electric Products, Inc., Indianapolis 8, Ind.
411	Hardwick, Hindle, Inc., Newark 5, N. J.
412	+General Transformer Corporation, Chicago 7, Ill.
413	*Acme Electric Corporation, Cuba, N. Y.
414	+Radiation Products, Inc., Los Angeles 15, Calif.
415	+United Mfg. & Service Co., Milwaukee 2, Wis.
416	+Lewyt Corporation, Brooklyn 11, N. Y.
417	+Tone Products Corp. of America, New York 10, N. Y.
418	*United Transformer Corporation, New York 13, N. Y.
419	+Radio Development & Research Corp., Jersey City, N. J.
420	+Schrader Electronic & Coil Corp., Los Angeles 11, Calif.
421	+Lee Radio Manufacturing Corporation, New Hyde Park, N. Y.
422	+Crimp-Seal Products Co., Chicago 10, Ill.
423	North American Philips Company Inc., New York 17, N. Y.
424	*Milwaukee Stamping Company, Milwaukee 14, Wis.
425	*Essex Electronics, Berkeley Heights, N. J.
426	+E. W. McGrade Manufacturing Co., Kansas City 2, Mo.
427	+Communication Measurements Laboratory, Inc., New York 6, N. Y.
428	+Schulmerich Electronics, Inc., Sellersville, Pa.
429	+Bernard Rice's Sons, Inc., New York 16, N. Y.
430	Camburn, Inc., Woodside, Long Island, N. Y.
431	Waterman Products Company, Inc., Philadelphia 25, Pa.
432	+Premier Crystal Laboratories, Inc., New York 7, N. Y.
433	Cleveland Electronics, Inc., Cleveland 3, Ohio
434	+Electrical Reproduction Co., Chicago 22, Ill.
435	*Plastoid Corporation, Hamburg, N. J.
436	+Adaptol Company, Brooklyn 13, N. Y.
437	+Newcomb Audio Products Company, Los Angeles 7, Calif.
438	The Gudeman Company, Chicago 10, Ill.
439	Collins Radio Company, Cedar Rapids, Iowa
440	Cannon Electric Company, Los Angeles 31, Calif.
441	Gilner Manufacturing Company, Steger, Ill.
442	J-B-T Instruments, Inc., New Haven 8, Conn.
443	+Quakertown Luggage Company, Phildelphia 47, Pa.
444	+A. F. Smuckler & Co., New York 6, N. Y.
445	*Mississippi Products, Inc., Jackson, Miss.
446	Good-All Electric Mfg. Co., Ogallala, Nebr.
447	*Radionic Controls, Inc., Herrin, Ill.
448	*Radiomarine Corporation of America, New York 13, N. Y.
449	Wilder Manufacturing Corp., Herrin, Ill.
450	Columbus Process Co., Inc., Columbus, Ind.
451	+Vertrod Corporation, New York 17, N. Y.
452	Empire Coil Company, Inc., New Rochelle, N. Y.
453	+Russell Electric Company, Chicago 10, Ill.
454	Telequip Radio Company, Chicago 8, Ill.
455	Dynavox Corporation, Long Island City 1, N. Y.
456	+Fisher Radio Company, New York 17, N. Y.
457	Herlec Corporation, Sub. of Sprague Electric Co., Milwaukee 3, Wis.
458	+General Anline & Film Corporation, New York 17, N. Y.
459	*General Communication Company, Boston 15, Mass.
460	+Dual Engineering Corporation, Chicago 22, Ill.
461	Barker & Williamson, Inc., Upper Darby, Pa.
462	+Communications Co., Inc., Coral Gables 34, Florida
463	+Testing Instruments, Inc., Dayton 2, Ohio
464	*Q. L. C. Corporation, Summit, N. J.
465	Oxford Electric Corporation, Chicago 15, Ill.
466	Delco Radio Division, General Motors Corporation, Kokomo, Ind.
467	Grigsby-Allison Company, Inc., Arlington Heights, Ill.
468	Cinaudagraph Speakers, Division of Aireon Manufacturing Corp., Kansas City 15, Kan.
469	+Gem Phono Manufacturing, Inc., New York 19, N. Y.
470	+Kings Electronics Company, Brooklyn 5, N. Y.
471	+Precision Parts Company, Ann Arbor, Mich.
472	*Pyramid Electric Company, North Bergen, N. J.
473	+United Speakers, Inc., Los Angeles 23, Calif.
474	Special Products Company, Silver Spring, Md.
475	*Glass Products Company, Chicago 37, Ill.
476	+Airdesign, Incorporated, Upper Darby, Pa.
477	+Electro-Tone Corporation, Hoboken, N. J.
479	The National Varnished Products Corp., Woodbridge, N. J.
481	Harnett Electric Corporation, Port Washington, N. Y.
482	Rada Products Co., Chicago 12, Ill.
483	+Houston Radio & Television Co., Houston, Texas
484	*Shurite Meters (J-B-T Instruments, Inc.), New Haven 8, Conn.
485	*Scott Radio Laboratories, Inc., Chicago 40, Ill.
486	+Lectrovision, Inc., New Rochelle, N. Y.
489	*Radio Television Products Corp., Grass Lake, Mich.
493	+Dormitzer Electric & Mfg. Corp., Boston 15, Mass.
494	Fidelity Products Co., Inc., So. Orange, N. J.
498	+Radio Mfg. Engineers, Inc., Peoria 6, Ill.
499	+Speaker Corporation of Chicago 22, Ill.
501	Standard Piezo Company, Carlisle, Pa.
502	+American Radio Hardware Co., Inc., Mt. Vernon, N. Y.
503	Caledonia Electronics & Transformer Corp., Caledonia, N. Y.
504	The James Knights Company, Sandwich, Ill.
505	Precision Apparatus Company, Inc., Elmhurst, L. I., N. Y.
506	+Micarata Fabricators, Inc., Chicago 40, Ill.
507	John Volkert Metal Stampings, Inc., Queens Village, L. I., N. Y.
508	The Hickok Electrical Instrument Co., Cleveland, Ohio
511	*The Joyner Corporation, Chicago 44, Ill.
512	+Electronic Associates, Inc., Long Branch, N. J.
514	*Audio Electric Company, Chicago 26, Ill.
515	Electronic Components Corporation, Chicago 10, Ill.
516	United Condenser Corporation, New York 54, N. Y.
517	Audak Company, Inc., New York 18, N. Y.
518	*Sampson Electric Products Co., Clinton, N. C.
519	+American Volume Control Corporation, New York 6, N. Y.
520	Schneider & Marquard, Inc., Brooklyn 17, N. Y.
523	+Transmitter Equipment Mfg. Co., Inc., New York 14, N. Y.
524	Triwec Transformer Company, Chicago 18, Ill.
525	Crucible Steel Company of America, New York 17, N. Y.
527	Valpey Crystal Corporation, Holliston, Mass.
528	Columbus Electronics Corporation, Yonkers, N. Y.
529	Wheeler Laboratories, Inc., Great Neck, N. Y.
530	Clippard Instrument Laboratory, Inc., Cincinnati 14, Ohio
532	*Ward Leonard Electric Co., Mount Vernon, N. Y.
535	Hedco Manufacturing Corporation, Chicago 10, Ill.
536	Tel-Instrument Co., Inc., East Rutherford, New Jersey
539	Powdered Metal Products Corporation of America, Franklin Park, Ill.
540	*Radio Industries, Inc., Chicago 40, Ill.
541	Industrial Television, Inc., Clifton, N. J.
543	+The Nielsen Television Corporation, Norwalk, Conn.
544	+Stephens Mfg. Corporation, Culver City, Calif.
545	Electronic Enterprises, Inc., Newark 4, N. J.
547	*Anaconda Wire & Cable Company, Hastings-On-Hudson 6, N. Y.
548	*B.J. Toegel, Inc., Plainfield, N. J.
549	*Mid-West Coil & Transformer Co., Chicago 14, Ill.
550	*Standard Winding Company, Newburgh, N. Y.
551	American Television & Radio Co., St. Paul 1, Minn.
552	Otis Radio & Electric Corp., Hawarden, Iowa
553	*Wesco Electric Company, Inc., Chicago 30, Ill.
554	American Phenolic Corporation, Chicago 50, Ill.
555	*Waldom Electronics, Inc., Chicago 10, Ill.
556	*The Halldorson Company, Chicago 40, Ill.
557	Electronic Products Company, Mt. Vernon, N. Y.
558	+Eagle Electronics, Inc., New York 13, N. Y.
559	+Lyman Electronic Corp., Springfield 4, Mass.
560	+Stark Sound Engineering Corporation, Fort Wayne, Ind.
562	Polarad Electronics Corporation, Brooklyn 11, N. Y.
563	J. W. Davis & Company, Dallas 9, Texas
565	+Electrovox Company, Inc., East Orange, N. J.

CODE NO.	COMPANY
566	+Television Projects, Inc., Newark 2, N. J.
569	*Electrical Utilities Company, La Salle, Ill.
570	*Leonard Electric Products Co., Inc., Brooklyn 32, N. Y.
571	+General Cable Corp., New York 17, N. Y.
572	*F. & V. Coil Winding Corporation, Newark 5, N. J.
573	Alcon Metal Products, Inc., Chicago 47, Ill.
574	*Stanwyck Winding Company, Newburgh, New York
575	*Heppner Manufacturing Company, Round Lake, Ill.
577	The La Pointe Plascamold Corp., Windsor Locks, Conn.
578	+The International Electronics Company, Philadelphia 30, Pa.
579	Belden Manufacturing Company, Chicago 44, Ill.
580	Rowe Industries, Toledo 9, Ohio
581	Aircraft-Marine Products Inc., Harrisburg, Pa.
582	+General Precision Equipment Corporation, New York 7, N. Y.
583	Tele King Corporation, New York 1, N. Y.
584	W. M. C. Inc., Chicago 47, Ill.
585	*American Insulator Corporation, New Freedom, Pa.
586	Drake Manufacturing Company, Chicago 22, Ill.
587	Radio Specialty Manufacturing Co., Portland 14, Ore.
588	Barnes Metal Products Company, Chicago 23, Ill.
589	David Bogen Co., Inc., New York 12, N. Y.
590	Shure Brothers, Inc., Chicago 10, Ill.
591	+Crown Capacitor Corporation, Wrentham, Mass.
592	Perfection Electric Company, Chicago 16, Ill.
593	Kip Electronics Corporation, New York 14, N. Y.
594	+Kobzy Tool Company, Chicago 22, Ill.
596	The Gramer Transformer Company, Chicago 39, Ill.
597	Stevens Wire Insulating Company, Chicago 39, Ill.
598	+Deluxe Coils, Inc., Wabash, Indiana
599	*Elco Corporation, Philadelphia 40, Pa.
600	+Ansley Radio & Television Inc., Trenton 9, N. J.
601	+Engineering Services, Inc., Evansville 8, Ind.
602	+Eastern Transformer Company, Inc., New York 11, N. Y.
603	*Eltran Corp., St. Anne, Ill.
604	The Staver Company Incorporated, Brooklyn 1, N. Y.
605	+Stanley Spring Mfg., Co., Chicago 12, Ill.
606	Woodward-Schumacher Electric Corporation, Chicago 22, Ill.
607	Consolidated Wire & Associated Companies, Chicago 16, Ill.
608	*TELvision Laboratories, Inc., Chicago 44, Ill.
609	Markel Electric Products, Inc., Buffalo 3, N. Y.
610	Carter Parts Company, Chicago 10, Ill.
611	+Holiday Specialties, Inc., New York 12, N. Y.
612	+Radio Merchandise Sales, Inc., New York 55, N. Y.
613	+Star Products Company, Chicago 10, Ill.
614	Simpson Electric Company, Chicago 44, Ill.
615	+Reynolds Metals Company, Louisville Ky.
616	Illinois Condenser Co., Chicago 22, Ill.
617	RAM Electronics, Inc., Irvington-On-Hudson, N. Y.
618	*TV Products Corporation, Paterson 3, N. J.
619	+Bowers Battery and Spark Plug Co., Reading Pa.
620	Kay Electric Company, Pine Brook, N. J.
621	*Zenith Optical Company, Huntington 19, W. Va.
622	+Mifflinburg Body Works, Inc., Mifflinburg, Pa.
623	Anchor Radio Corporation, Chicago 23, Ill.
624	Surprenant Mfg. Co., Boston 8, Mass.
625	*The Orsenigo Company, Inc., Westerly, R. I.
627	+Churchill Cabinet Co., Chicago 47, Ill.
628	*Davis Electric Company, Cape Girardeau, Mo.
629	*Anchor Industrial Company, New York 13, N. Y.
630	+Magnetic Corp. of America, Chicago 22, Ill.
631	Pickering and Company, Inc., Oceanside, N. Y.
632	*El-Rad Manufacturing Co., Chicago 13, Ill.
633	American Television, Inc., Chicago 5, Ill.
634	*Todd Products Co., Inc., Mt. Vernon, N. Y.
635	*Todd-Tran Corp., Mt. Vernon, N. Y.
636	Sheldon Electric Company, Div. of Allied Electric Products, Inc., Irvington 11, N. J.
637	Central Coil Company, Inc., Indianapolis 22, Ind.
638	Industrial Development Engineering Associates, Inc., Indianapolis 4, Ind.
639	Johnson & Hoffman Mfg. Co., Rockville Centre, N. Y.
640	Northern Metal Products Company, Chicago 24, Ill.
641	+Caliri Mfg. Co., West Orange, N. J.
642	Mycalex Corporation of America, Clifton, N. J.
643	National Aeronautical Corporation, Ambler, Pa.
644	General Railway Signal Company, Rochester 2, N. Y.
645	+Alamo Tel. & Radio Co., San Antonio, Texas
646	+R. K. L. Electro Winding Corp., Delevan, N. Y.
647	American Structural Products Co., Sub. of Owens-Illinois Glass Co., Toledo 1, Ohio
648	*American Radionic Co., Inc., Brooklyn 17, N. Y.
649	Electro-Voice, Inc., Buchanan, Michigan
650	+Central Commercial Co., Chicago 4, Ill.
651	*Jewel Radio Corporation, Long Island City 1, N. Y.
653	Wind Turbine Company, West Chester, Pa.
654	Square Root Manufacturing Corp., Yonkers 3, N. Y.
655	J. A. Maurer, Inc., Long Island City 1, N. Y.
656	Orsyd Company, Detroit 10, Mich.
657	Lowell Metal Products Corporation, St. Louis 7, Mo.
658	Snagamo Electric Company, Springfield, Ill.
659	John R. Hollingsworth Corporation, Clifton Heights, Pa.
662	Weller Electric Corporation, Easton, Pa.
666	Winsted Division, Hudson Wire Company, Winsted, Conn.
667	Arcturus Electronics, Inc., Newark 4, N. J.
668	*Standard Electrical Products Co., Dayton 3, Ohio
669	Advance Transformer Company, Chicago 40, Ill.
670	Glaser-Steers Corporation, Belleville 9, N. J.
671	Lytle Engineering & Mfg. Co., Chicago 25, Ill.
672	Thomas Electronics, Inc., Passaic, N. J.
673	Ampro Corporation, Chicago 18, Ill.
674	Shoup Engineering Company, Chicago 16, Ill.
675	Electronic Industries Inc., Springfield, Ohio
676	Penn Boiler and Burner Mfg. Corp., Lancaster, Pa.
677	*Rogers Electronic Corp., New York 12, N. Y.
678	Rhode Island Insulated Wire Co., Inc., Cranston, R. I.
679	*Tech-Master Products Company, New York 13, N. Y.
680	Conrac, Incorporated, Glendora, Calif.
681	American Lava Corporation, Chattanooga 5, Tenn.
682	*Electrical Windings, Inc., Chicago 39, Ill.
683	Wright Zimmerman, Inc., New Brighton, Minn.
684	*Sarkes Tarzian, Inc., Bloomfield, Ind.
685	General Ceramics and Steatite Corp., Keasbey, N. J.
686	H. S. Martin & Company, Evanston, Ill.
687	*Hillburn Electronic Products Co., Brooklyn 22, N. Y.
688	Trad Television Corporation, Asbury Park, N. J.
689	*Aladdin Radio Industries, Chicago, Ill.
692	CELCO (Constantine Engineering Laboratories Co.), Mahwah, N. J.
693	Multi-Tron Laboratory, Chicago 44, Ill.
694	Standard Electronics Corporation, New York 18, N. Y.
695	Basler Electric Company, Highland, Ill.
696	The Turner Company, Cedar Rapids, Iowa
696	*Phalo Plastics Corporation, Worcester 8, Mass.
697	Sheffco Manufacturing Co., Palisades Park, N. J.
699	Keystone Electronics Company, Stamford, Conn.
700	The Radion Corporation, Chicago 22, Ill.
701	Forbes & Wagner, Inc., Silver Creek, N. Y.
702	Radio Apparatus Corporation, Indianapolis, Ind.
703	Product Development Co., Inc., Arlington, N. J.
704	Cosmic Radio Corporation, New York 59, N. Y.
705	*Ajax Condenser Co., Inc., Chicago 14, Ill.
706	Pioneer Electronics Corporation, Santa Monica, Calif.
707	*Anchor Electronics Inc., Union City, N. J.
708	Bell Sound Systems, Inc., Columbus 7, Ohio
709	The Rodefer Glass Company, Bellaire, Ohio
710	*Standard Condenser Company, Chicago 47, Ill.
711	*Sampsel Time Control, Inc., Spring Valley, Ill.
712	*Control Corporation, Minneapolis 14, Minn.
713	Taylor Tubes, Inc., Chicago 47, Ill.
714	General Vacuum Tube Corp., Ardsley, N. Y.
715	Technology Instrument Corporation, Acton, Mass.
716	*Rockwell Transformer Co. (Div. of Arrow Engineering Corp.), Chicago 31, Ill.
717	Arthur Ansley Manufacturing Co., Doylestown, Pa.
719	Carbonneau Industries, Inc., Grand Rapids 2, Mich.
720	Methode Manufacturing Corp., Chicago 47, Ill.
721	*Rollan Electric Co., Chicago 19, Ill.
722	Milwaukee Resistor Co., Milwaukee 4, Wis.
723	Northwest Plastics, Inc., Saint Paul, Minn.
724	Jeffers Electronics, Inc., Dubois, Pa.
725	Copperweld Steel Company, Glassport, Pa.
726	Penn Television Products Co., Philadelphia 34, Pa.
727	*Rieder Bros., Philadelphia 34, Pa.
728	*Homecraft Mfg. Corporation, Newark 5, N. J.
729	*The American Woodworking Co., West Haven 16, Conn.
730	Jersey Specialty Co., Inc., Little Falls, N. J.
731	*Central Transformer Company, Chicago 7, Ill.
732	Radio Materials Corporation, Chicago 13, Ill.
733	Alpha Metals, Inc., Brooklyn 1, N. Y.
734	Fretco Television Company, Pittsburgh 19, Pa.
735	*The Formatic Company, Naugatuck, Conn.
736	*Paul & Beekman, Inc., Philadelphia 40, Pa.
737	Technical Appliance Corporation, Sherburne, N. Y.
738	Lewis and Kaufman, Inc., Los Gatos, Calif.
739	Oak Electronics Company, Buffalo 3, N. Y.
740	Olympic Metal Products Company, Inc., New York 7, N. Y.
741	The Whitney Blake Company, New Haven 14, Conn.
742	*Esquire Radio Corporation, Brooklyn 2, N. Y.
743	*Madisco, Inc., Philadelphia 24, Pa.
744	Hughes Aircraft Company, Culver City, Calif.
745	*Tempel Manufacturing Company, Chicago 26, Ill.
746	L. H. Frost & Company, Grand Rapids 2, Mich.
747	*Altair Corporation, New York 13, N. Y.
748	*Russell Speaker Co., Chicago 29, Ill.
749	*National Electronics, Incorporated, Geneva, Ill.
750	Mosely Electronics, Overland 14, Mo.
751	*Special Products Division, Essex Wire Corporation, Chicago 41, Ill.
752	Electronic Devices, Inc., Brooklyn 15, N. Y.
753	Redmond Company, Inc., Owosso, Mich.
754	*Permaglass, Incorporated, Genoa, Ohio
755	*Electronic Expediters, Chicago 1, Ill.
756	Universal Company, High Point, N. C.
757	*Grand Transformers, Inc., Grand Haven, Mich,
758	*The Electrometric Co., Woodstock, Ill.
759	Grayburne Corporation, New York 13, N. Y.
760	Co-Operative Industries, Inc., Chester, N. J.
761	*Planet Manufacturing Corp., Bloomfield, N. J.
762	Erca Tool Die & Stamping Co., Brooklyn 22, N. Y.
763	Electronics & Nucleonics, Inc., New York 1, N. Y.
764	*The Danbury Transformer Corp., Danbury, Conn.
765	+Videon Electronic Corporation, Indianapolis 4, Ind.

The PHOTOFACT Servicer

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NEW PARTICIPANT

We are pleased to announce that the products of Triad Transformer Manufacturing Company, 2254 Sepulveda Blvd., Los Angeles, California will be included in Photofact Folders beginning with Set 175.

* * *

Fuse Information Added to Tube Placement Charts -

For quick location of fuses used in television receivers, refer to the tube placement charts in Photofact Folders. In addition to the location, the rating and circuits protected are also given on these charts. For replacement data refer to parts list.

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FACTORY SERVICE HINTS

The following service hints are brought to you through the courtesy of the Admiral Corporation, "Radio and Television Service Bulletin."

ADMIRAL 21 Series Chassis
Photofact Set 135, Folder 2
and Prod. Chge. Bul. 31, Photofact Set 156, Folder 2

Vertical roll due to faulty tubes, check by replacement:

V12 - 12AU7 or 6SN7GT sync separator and clipper.

V1 - 6CB6, 6BC5 or 6AG5 RF amplifier in 94C18-4 tuner. Leakage between elements will cause sync pulse clipping due to incorrect AGC voltage.

V7 - 6AC7 video amplifier. Excessive current drawn by 6AC7 will cover sync pulse clipping.

Vertical roll due to faulty 1N64 Germanium Diode. (See Prod. Chge. Bulletin, Photofact Set 156, Folder 2)

A rough check of the 1N64 germanium diode can be made by disconnecting one side of the diode from the circuit and checking the front to back ratio with the ohmmeter range of a VTVM. (Diodes are easily ruined by heat and to eliminate the possibility of damage by heat, disconnect the diode from the circuit by lifting the peaking coil L12 from the tie point which is connected to pin 4 of V7.) The front to back ratio should be on the order of 1000 to 1500 times, i.e. if a diode measures 300 ohms in one direction, it should read 300,000 to 500,000 ohms in the other direction.

Lead dress is very important in this circuit in order to prevent high peak voltages from the AGC circuit causing damage to the germanium diode.

Be sure to:

1. Dress the germanium diode away from the white lead connected to pin 5 (plate) of AGC tube 6AU6.
2. Dress the white lead close to the chassis.
3. Dress the orange lead connected to pin 1 of AGC tube (6AU6) well away from video amplifier tube 6AC7.

Excessive snow in the picture can be caused by faulty tubes in the receiver. Check receiver as follows:

Short circuit the antenna terminals and turn the picture control (contrast) fully clockwise.

Connect a vacuum tube voltmeter across the video detector load (point "A" to chassis). Set the channel selector on an unassigned channel. If the voltmeter reading exceeds .6 volt negative, excessive receiver (tube) noise is indicated. This condition can usually be corrected by tube substitution. Substitute tubes in the following order: Video detector tube V6 (if a vacuum tube is used as detector), RF oscillator tube V2, RF amplifier tube V1 and IF amplifier tube V3, V4 and V5. Check germanium diode (if a germanium diode is used as video detector).

Corona or arcing in the second anode supply can also cause a high noise reading at the video detector resulting in excessive snow in weak signal areas.

Miscellaneous Troubles Due to Faulty Tubes

Faulty tubes cause the majority of receiver troubles. The list below contains most common troubles which are generally due to faulty tubes.

1. Poor fringe area reception due to low B plus voltage. Check 5U4G tube.
2. Poor fringe area reception due to low sensitivity. Check 6AU6, 6BQ7 and 6BK7 tubes, if used in receiver.
3. Picture and sound separated due to IF oscillation. Check 6AU6 tubes.
4. Picture bending caused by leakage between tube elements. Check 6BC5 and 6CB6 tubes.
5. Poor sync stability, usually more noticeable in vertical. Check 12AU7 tube.
6. Washed out picture due to negative grid current. Check 6AC7 tube.

* * *

The following service hints are brought to you through the courtesy of the Capehart-Farnsworth Corporation, "Capehart Service Bulletin."

Capehart Chassis Series CX-33DX
Photofact Set 160, Folder 2

Unstable sync not readily correctable by proper adjustments of provided sync controls. Check following tubes and symptoms.

1N34 (M4) - Crystal Video Detector - If this is defective, there is a tendency toward weak (washed-out) picture, very poor sound quality, and intermittent loss of vertical sync stability. In the extreme case, no picture and no sound will result.

6CB6 (V11) - 1st Sync Amplifier - If bad, or characteristics have changed extensively, both the vertical and horizontal sync will be critical. In most cases, vertical will be affected more than horizontal.

12AT7 (V12) - Sync Separator & AGC Detector and Noise Clipper - If symptom is a very slow vertical roll with tendency to lock in with blanking bar showing on screen, check this tube.

12AU7 (V13) - 2nd Sync Amplifier and AGC Amplifier - If operating characteristics of this tube have changed, there may be a tendency to vertical jitter at top of picture.

6K6 (V15) - Vertical Output Tube - If the vertical linearity control is ineffectual in compressing, either top, or more frequently, bottom of picture, try replacing this tube.

6AL5 (V16) - Horizontal Sync Disc - Unbalanced current conditions in this tube may cause horizontal blanking bar to appear. Poor tube - horizontal oscillator will be free-running.

6AU6 (V17) - Horizontal AFC - Poor tube - tendency to cause horizontal snaking in the picture or drift of horizontal sync after a warmup period. Heater to cathode leakage will result in extreme distortion of picture and loss of horizontal sync.

6SN7 (V18) - Horizontal Oscillator - Poor tube - will cause poor focus and shrinking of picture.

6BG6 (V19) - Horizontal Output Tube - Poor tube - will cause poor focus and shrinking of picture.

If tubes have been checked with no success, stubborn cases of unstable sync may be solved by the use of the logic and pointers which follow.

Vertical Sweep Circuit -
Tubes -
1. Have all tubes been carefully checked?

Capacitors -
1. C66 (.047,1000V) - low in capacity. Produces poor interlace.
2. C64 (.001 mfd., 1000V) - changed to .0012 allowing for sets in which height control ran too near end causing instability, leaky, excessive, "winking," of vertical scan.

Resistors -
1. Defective temperature compensation resistor R104.
2. Check value of R102.

Wiring -
1. Check for errors - R102 (15K) returned to chassis instead of -100. Vertical frequency change, critical hold.
2. C26 (.1 mfd.) AGC bypass or C32 AGC bypass either omitted or both connected to same point producing slight horizontal pulse modulation deteriorating picture and pulse content may affect vertical stability.

Sync Separation Circuit -
Tubes -
1. Have all tubes been carefully checked?

Capacitors -
1. C58 (100 mmf., mica) - low or leaky, horizontal phase shift and definite loss of vertical hold, usually critical vertical adjustment and locking out of frame. If replacement is necessary, use silver mica capacitor.
2. C59 (.01 mfd., 600V) - low in capacity. Introduces too much horizontal, causing premature triggering of vertical hold, vertical flip and occasional roll.
3. C56 (.047,600V) - open, causing vertical sync instability, slow roll, may lock with blanking bar on screen, highly critical vertical hold control setting.
4. C55 (220 mmf., mica) - low in capacity or open. Loss of horizontal stability (some phase shifting).

Resistors -
1. R58 was 330K which caused clipping of vertical sync in some sets due to production variables, thus producing vertical instability, usually jitter at top of frame. Replace with 1 meg.
2. Check value of R71.

Wiring -
1. Check for wiring errors.

Horizontal AFC Circuit -
Tubes -
1. Check all tubes carefully.

Resistors -
1. Check bleeder supply resistors, R107A & B, R110, R112.

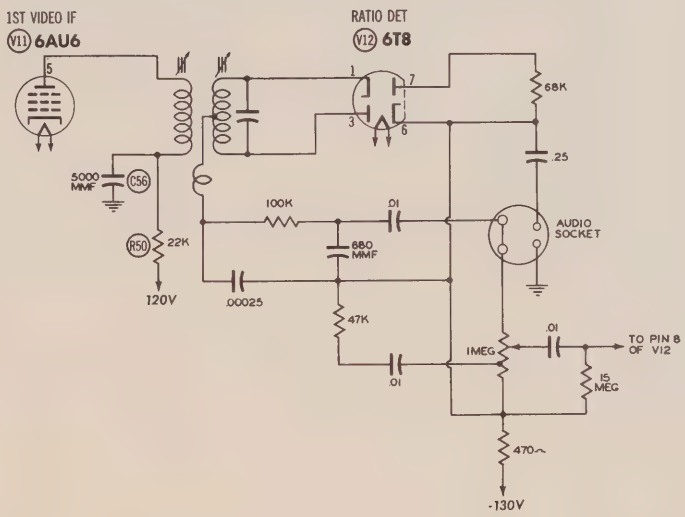
Capacitors -
1. Check C72 (100 mfd.) by substitution. Use silver mica if replacement is necessary.

Wiring -
1. Check 6AL5 (V16) and 6AU6 (V17) tube socket contact, also check chassis ground connections at these tube sockets.

Voltage and Resistance -
1. If trouble has not been located by above, make further voltage and resistance checks to locate the particular defective component.

* * *

SUPPLEMENTAL DATA TO PHOTOFACT FOLDER 12 IN SET 154

	Production changes on Sylvania Chassis 1-387-1 through Code C01 were covered in Photofact folder 12 in set 154. Later production changes on chassis 1-387-1 are as follows:
Code C02	Resistors R63, R64 and R65 were removed. The AGC control, R8, was then connected between pin 8 of the AGC tube and the -130V line.
Code C03	The 4th. video IF amplifier, V6, was replaced with a type 6CB6 tube and the socket wiring was changed to accommodate the tube. R36, across the input to the video detector, was changed to 8200Ω.
Code C04	A 10KΩ resistor was added in series with the high voltage anode lead to the picture tube.
Code C05	The heater connections to the vertical oscillator and output tube, V15, were moved to the power transformer filament winding that is grounded.
Code C06	For improved focus, the B+ lead to the vertical output circuit was changed so as to connect to the red lead of the vertical output transformer.
Code C07	R32, in parallel with the secondary of the 4th. video IF cathode trap, was changed to 22KΩ.
Code C08	Sound IF coils L30 and L31 were replaced with a single transformer unit, part #128-0008. A schematic showing the changes in the ratio detector circuit is given below.
	
	When the new ratio detector transformer is used, portions of steps 9 and 10 of the alignment instructions are revised. The sweep and marker generators are connected as before, but the oscilloscope is connected across the volume control. The ratio detector cores are then adjusted to obtain the response curve of figure 4.
Code C09	C66A and B, filament bypass capacitors for V12, were removed.

CONTINUED ON REVERSE SIDE

SYLVANIA MODELS 22M-1, -2, 23B, -1, M, M-1, -3, 25M, -1 (Ch. 1-387-1)

PRODUCTION CHANGES
BULLETIN 41

PRODUCTION CHANGES
BULLETIN 41

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed." "Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1952 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

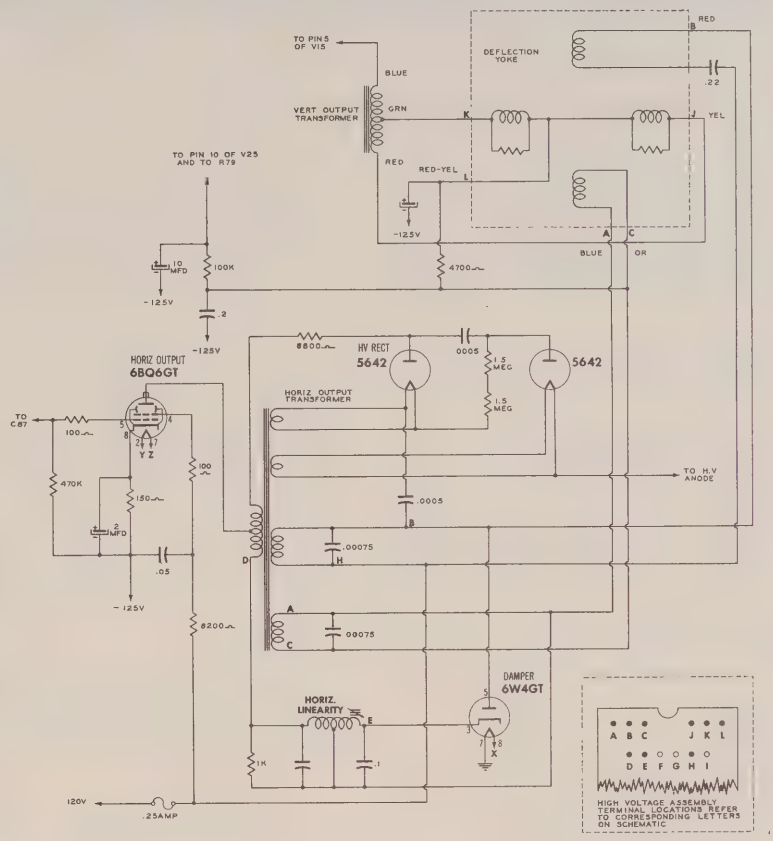
Code C10	R80 was changed to 680KΩ. A 15KΩ resistor was added in series with the brightness control and ground. A 150KΩ resistor was added from the junction of the 15KΩ resistor and the brightness control to 120V. A .1MFD capacitor was added from pin 7 of the horizontal AFC tube, V17, to ground.
Code C11	R29 was changed to 18KΩ. A 4.5MC trap was added in series with 4.7MMF capacitor from the plate of the video output tube to ground. This trap is aligned as follows: 1. Ground pin 1 of the 4th. video IF tube, (6CB6). 2. Connect the signal generator through .001 to .005MFD capacitor to pin 1 of the video amplifier tube. Adjust signal strength for .5V at 4.5MC output. 3. With VTVM set for RF reading, connect probe to under chassis termination of picture tube cathode. 4. Adjust 4.5MC trap for minimum reading on VTVM.
Code C12	An RF choke, part #147-0014, was added in the circuit between C59 and R56 in place of the direct connection. A 5000MMF capacitor was added from 5 of V12 (6T8) to ground.
Code C13	The horizontal control tube, V17, was changed to a type 6CB6. A 220Ω resistor was added between the -125V line and pins 2 and 7 of the horizontal AFC tube.
Code C14	The height control was changed to a 1.5 megohm unit part #153-0001. R80 in series with the height control was changed to 470KΩ.

Sylvania chassis 1-437-1 (Models 74B-1 and 74M-1) is identical to chassis 1-437 covered in Photofact folder 15 in set 131 except for the following differences:

Chassis 1-437-1 uses a deflection yoke part #100-0003.

The filament transformer for the damper tube heater was omitted when the new horizontal output transformer and deflection yoke were used.

The horizontal output circuit employed in chassis 1-437-1 is shown in the partial schematic below.



Code C01 Models 73B-5, 73M-3, 73M-5, 73M-6 (Ch. 1-437-3)	To improve the IF amplifier response, R29 was changed to 22KΩ. Chassis 1-437-3 is identical to chassis 1-437-1 except that the Sylvania Halo-Light feature is employed.
Code C02	To improve control of vertical size, R82, was changed to 680KΩ. To improve operation of the brightness control two resistors were added. A 15KΩ resistor was added between ground and the low side of the brightness control and a 150KΩ resistor was added from the junction of the 15KΩ resistor and brightness control to +125V. To improve horizontal phasing, a .1MFD capacitor was added from pins 2 and 7 of the horizontal AFC tube to ground.
Models 74B-2, 74M-2 (Ch. 1-437-2)	Sylvania Models 74B-2 and 74M-2 (Ch. 1-437-2) are electrically similar to the models for chassis 1-437-3 (C01). However, the ratio detector units are combined to a single unit part #128-0008.
Code C01 (Ch. 1-437-2)	Code change C01 for chassis 1-437-2 provides reduced 4.5MC sound interference in the picture. This change adds a 4.7MMF capacitor from the plate video amplifier in series with a 4.5MC trap coil (part #130-0001) to ground. The alignment procedure for this trap coil is outlined on the reverse side.

CONTINUED ON REVERSE SIDE

	1. Connect the grid (pin 1) of the 4th. video IF amplifier to ground. 2. Connect a signal generator through a .001 to .005MFD capacitor to the grid (pin 1) of the video amplifier tube. 3. With VTVM set for RF readings, connect the probe to the junction of R44 and R45. 4. Set signal generator for approximately .5V output at 4.5MC and adjust the core of the trap coil for minimum reading on VTVM.
Code C03 (Ch.1-437-3)	Same as code change C01 for Ch.1-437-2)
Code C04	Code change C04 not used.
Code C05 (Ch.1-437-3)	The ratio detector transformer was relocated closer to V12 (6T8). A .005MFD capacitor was connected from pin 5 of V12 (6T8) to ground. An RF choke was added from the junction of C60, the volume control, R9, etc., to the junction of R60, the cathode of the AF amp., and R68.
Code C02 (Ch.1-437-2)	Same as code change C05 for chassis 1-437-3.

The PHOTOFACT Servicer

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FACTORY SERVICE HINTS

The following Service Hints covering DuMont Television Receivers, originally published in the DuMont Service News, are brought to you through the courtesy of Allen B. DuMont Laboratories, Inc.

Model RA-119A, Photofact Set 156, Folder 5

Symptom: No high voltage.

Probable Fault: Filament of V38 (1B3) in high-voltage power supply open. The filament winding of the V38 is improperly positioned on the high-voltage transformer.

Remedy: Move the filament winding of V38 3/16 inch further from the high-voltage winding. Replace V38.

\- - -

Symptom: Picture very bright and reduced to half normal height. Vertical sweep failure protection relay closes, when Teleset is turned on, and then continues to open and close.

Probable Fault: C154, the .05 mfd. capacitor in the plate circuit of V40, on the power supply chassis, is shorted. R177, at the cathode of V41, burned out.

Remedy: Replace C154 and R177. C154 should be replaced with a 1000 volt capacitor.

\- - -

Symptom: Dark vertical line, approximately five inches from the right side of the picture. In several cases, two or more lines appear.

Probable Fault: The 31.5 kc signal of the high-voltage power supply is entering the video IF's.

Remedy: Bypass the 338 volt B+ line in the high-voltage chassis by connecting a .01 mfd., 600 volt capacitor from the B+ side of the solenoid M6 to ground.

\- - -

Symptom: Fluctuating picture contrast. Overload on strong signals. A check of the AGC line indicates that the AGC voltage is also fluctuating. Symptoms may occur only when the set is cold, or after several hours of operation.

Probable Fault: C72 in the plate circuit of the AGC detector, V20, is intermittently shorting.

Remedy: Replace C72.

* * *

Models, All Using Spiral Type Inductuners.

Symptom: Intermittent snow in picture.

Probable Fault: Poor contact between the inside end of one of the Inductuner spiral coils and its associated contact lug.

Remedy: The following procedure can be used with extreme caution, to correct this condition.

1. Remove the four lock nuts holding the top cover of the Inductuner and take off the cover.

Note: In the RA-112A and RA-113 the Inductuner must be removed from the main chassis before step 1 can be accomplished.

2. Tilt the Inductuner chassis so that the shaft of the Inductuner is at an angle of 60°, with the front of the chassis up.

3. Using a 150-watt soldering iron, with a 1/4" tip, heat the lug contacting the inner end of each spiral coil, as shown in (2) and (3) of Figure 1. Be sure that your soldering iron is clean and well tinned.

4. After each contact lug is heated, apply a very small amount of solder to the point where the lug and the spiral meet, as shown in (1) of Figure 2. The solder should be applied near the upper end of the lug and allowed to run down to the spiral. In most cases, the solder already present will be sufficient.

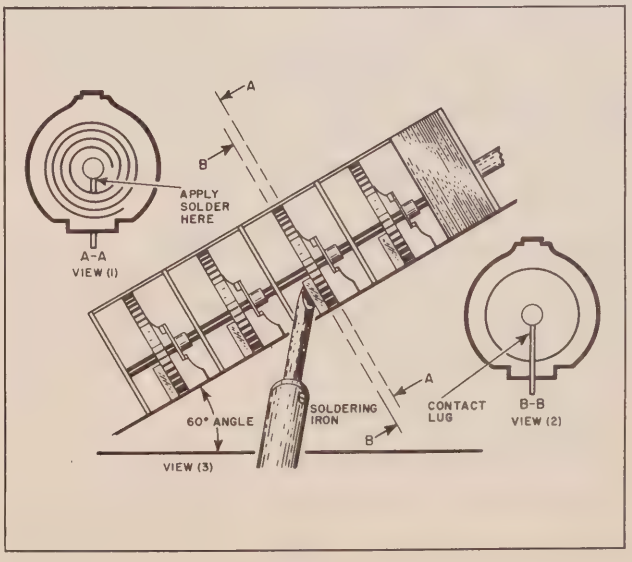


Figure 1

Caution: Care should be exercised to prevent solder from getting on the surface of the spiral. If too much solder is used at the joint, it will cause the "button" on the slider arm to raise and break contact. This will result in loud crackling noise when tuning through channel 7 to 8.

5. After soldering each spiral, wash the soldered areas with carbon tetrachloride and apply a thin coat of Lubriplate 105.

6. Make a final check of each Inductuner section by checking continuity between each rear lug and its associated slider arm. Since there is a coil shunted across the oscillator spiral, this section will show continuity even if the rear contact lug is not properly contacting the spiral.

- - -

Models, All

Symptom: Flashing on screen.

Probable Fault: The cover of the yoke connector is intermittently contacting the focus-coil case. While both are grounded, there is enough potential difference between them to cause the above difficulty.

Remedy: Redress the yoke cable.

- - -

Models, All using Metal Coné CRT's.

Symptom: Distorted picture and raster.

Probable Fault: The metal cone of the tube is magnetized.

Remedy: Locate the magnetized area of the CRT cone with a compass. Demagnetize the cone by passing it through a strong alternating magnetic field. Such a field may be produced by removing the case from a focus coil and passing AC, obtained from a Variac, or other suitable source, through the coil. The flat side of the coil should be passed over the magnetized area of the cone. The AC should not be interrupted while the coil is near the tube.

- - -

Models, All

Symptom: Dirty CRT face.

Probable Fault: Poor dust seal between CRT face and mask.

Remedy: Locate the opening in the seal and cement a strip of 1/4" felt to the mask at the proper point, to provide a tight seal. Speaker cone cement may be used. The dust will usually be thickest in the vicinity of the opening in the seal.

- - -

Symptom: Bright flashes on the screen.

Probable Fault: Arcing at the AC interlock receptacle.

Remedy: Check the male and female interlock connectors and replace if necessary.

Models, All Current Models

Symptom: Vertical fold-over at bottom of picture. Cannot be corrected with size or linearity control. Positive voltage on grid of vertical output tube.

Probable Fault: The .1 mfd. coupling capacitor at the grid of the vertical sweep amplifier is leaky or shorted.

Remedy: Replace the above capacitor.

* * *

BOOK REVIEW

TELEVISION SERVICING
by
Matthew Mandl

The Macmillan Company
New York 11, N. Y. Price $5.50

Part one deals with an introduction to television receiver fundamentals.

A discussion of circuits is included along with an explanation of each one.

The book deals with service techniques and the parallel between radio and television service. Localization of trouble in TV receivers is presented.

The major portion of the text contains a master index to common television troubles as that the reader may interpret symptoms in terms of circuit or component failure. A section is included on the choice of test equipment for proper television service, including a discussion of the oscilloscope, the sweep generator and associated equipment.

Through the use of illustrated trouble-shooting procedures, service for practically every type of failure likely to be encountered is covered in this excellent volume.

* * *

RADIO ANTENNA ENGINEERING
by
Edward A. LaPort

McGraw-Hill Book Co., Inc.
New York 10, New York. Price $9.00

This approach to antenna engineering contains information to enable the non-specialist to handle most problems of antenna design and construction.

The book deals with antennas for frequencies up to 30 megacycles including the more advanced designs, suggested from VHF and UHF techniques.

Both receiving and transmitting antennas for all types of communications work as well as broadcasting are covered. The book treats each antenna type in terms of its radiation, circuit and mechanical features. Also considered are operational requirements including propogation engineering and system engineering.

The material is written to explain the various type antennas, in use and to carry the reader through engineering requirements to commercial practices.

FIELD EXPERIENCES

For every "Field Experience" published, we issue a certificate good for one PHOTOFACT Folder Set. Awards are issued at the time of publication. Since it is impossible to verify the accuracy of contributions, we cannot be responsible for either the diagnosis made of the receiver trouble, or the results which will be obtained by following the suggested repair routine. All contributions become the property of Howard W. Sams & Co., Inc.

EMERSON Model 658B
Photofact Set 116, Folder 5

Complaint: Vertical retrace lines appear on the picture regardless of setting of the brightness control.

Analysis: Although at first glance the defect seemed to be in the picture tube, a comparison of the voltages taken at the picture tube socket with those shown on the Photofact Folder revealed an abnormal voltage at pin 2 due to the partial breakdown of C46.

Remedy: Replacement of C46 restored normal operation.

Mr. Louis M. Knoble
Knoble's Television Service
292 Paterson Ave.
Paterson 2, N. J.

* * *

PHILCO Model 49-501
Photofact Set 56, Folder 18

Complaint: The set was intermittently going dead with a noticeable change in brilliancy of pilot light.

Analysis: When the set went dead the filament of the 14B6 did not light up. The rest of the tubes remained lighted. (Filaments of all tubes in series.) Further checking showed a filament to cathode short within the 7A8 which was grounding the filament supply before it reached the 14B6 which was the circuits' regular return to ground.

Remedy: Replaced the 7A8.

Mr. John LaCapra
1556 Parker Street
Bronx 61, New York

* * *

MOTOROLA Ch. TS-14
Photofact Set 92, Folder 4

Complaint: Hum.

Analysis: Pulled tubes one at a time. If hum continued replaced tubes in socket. Removal of vertical output tube (6V6) stopped hum. New 6V6 did not remove the hum. Unsoldering of vertical output transformer leads also removed hum. Unit was defective.

Repair: Replaced defective vertical output transformer.

Mr. Louis Gaudio
305 Illinois Avenue
Aurora, Illinois

MCPAR Model 812
Photofact Set 139, Folder 8

Complaint: Blows fuses intermittently when dial is turned.

Cause and Remedy: Odd shaped wire hook shown in Photofact Dial cord drive illustration shorts intermittently to supply voltage lead lug on dial light dimmer switch. Remove casing from chassis and insulate lug with tape.

Mr. John Allen DeFrees
Triangle Appliance Service
Durhamville, R. D. #1, New York

* * *

MECK Model XN-752
Photofact Set 101, Folder 5

Symptom: Vertical sync. very unstable, falling out at any moment.

Analysis and Repair: Checked vertical oscillator circuit, substituted resistors and condensers. Finally, checked the integrator network by disconnecting the lead from R-63, and found a 150K ohm reading to ground, which under normal condition should have checked 500 megohms. C-59 was faulty component. Replaced condenser, and stability was restored to the vertical circuit.

Horace D. Westbrooks
P.O. Box 281
Griffin, Georgia

* * *

ZENITH Model 6D013

Complaint: Celluloid dial window on cabinet had warped so badly that it rubbed against dial pointer in spots.

Remedy: Removed window and ironed it under a damp cloth. That restored it's original shape. Let it cool before handling and replacing. Finished job looked as good as new.

Vince DiMaggio
DiMaggio Radio & Appliance
151 North Austin Boulevard
Chicago 44, Illinois

* * *

MOTOROLA Ch. TS-326A
Photofact Set 171, Folder 8

Complaint: No sound, no raster.

Cause and Remedy: Replacing 12AX4GT damper tube (Item V15). Restored sound to normal. Inspection showed leads of components connected to pins 4 and 5 of 6SN7 horiz. osc. (Item V13) shorted. Dressing leads away from each other restored high voltage and normal operation of receiver.

Mr. James H. Lynch
c/o Lougee-Robinson Co., Inc.
Laconia, New Hampshire

The PHOTOFACT Servicer

May 1, 1952 ★ Published for all users of Howard W. Sams' Photofact Folders ★ Vol. 17, Nos. 169 & 170

FACTORY SERVICE HINTS

The following Service Hints covering DuMont Television Receivers, originally published in the DuMont Service News, are brought to you through the courtesy of Allen B. DuMont Laboratories, Inc.

Models RA-103D, RA-104A, RA-110A
Photofact Set 93, Folder 4

Symptom: Low high voltage or no high voltage.

Probable Fault: Carbonized corona shield stand-off insulator. These insulators are sometimes cracked when the screw holding the insulator to the shield is drawn too tight. Moisture enters the crack producing high-voltage leakage which eventually carbonizes the insulator.

Remedy: Replace the defective insulator.

- - -

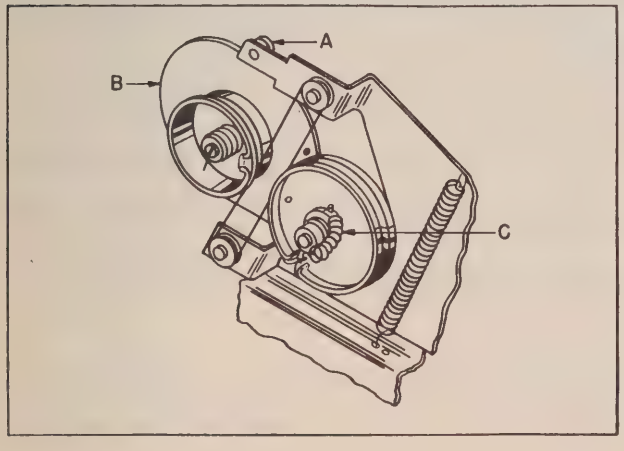


Figure 1

Symptom: The dial pointer jumps across sections of the dial. Observation of the cam follower idler wheel, A in Figure 1, shows that it is rising off the cam, B. Proper pointer action requires that the idler wheel be on the cam at all times.

Probable Fault: The dial cord, originally installed with the proper tension, has tightened up with age.

Remedy: Lessen the tension of the dial cord spring (C) until the idler wheel stops rising off the cam.

- - -

Symptom: No vertical hold - horizontal hold control setting critical. Plate voltage of sync clipper V16 is low.

Probable Fault: C81, the .1 mfd. 20% 400 volts coupling capacitor at the grid of the vertical buffer, is leaky.

Remedy: Replace C81.

- - -

Symptom: Picture appears over-loaded regardless of the setting of the contrast and brightness controls. After 15 minutes operation the picture becomes normal.

Probable Fault: One of the 6X4 rectifiers in the negative voltage supply is gassy.

Remedy: Replace the 6X4.

* * *

Model RA-109A, Photofact Set 110, Folder 7
Model RA-112A, RA-113, Photofact Set 119, Folder 5
Model RA-117A, Photofact Set 131, Folder 5

Symptom: High voltage fuse blows out repeatedly. A check of the high voltage circuits indicates normal operation.

Probable Fault: Intermittent short in the 5U4G, low voltage rectifier. An intermittent tube will usually produce a bright flash when struck with a pencil or similar object.

Remedy: Replace the defective tube.

* * *

Model RA-109A, Photofact Set 110, Folder 7
Models RA-112A, RA-113,
Photofact Set 119, Folder 5

Symptom: Interference with AM broadcast receivers, in the form of an audible beat.

Probable Fault: Harmonic radiation of the horizontal sweep signal.

Remedy: The following steps should be followed in the order given. After completing each step, check the results, using an AM receiver located approximately 25 feet from the TV receiver. If the interference is eliminated before the completion of all steps, the remainder of the procedure may be disregarded.

1. Connect a .02 mfd., 600 volt capacitor from each side of the line to ground, in the television chassis.

Note: These capacitors may already be incorporated.

2. If the 6W4 heater transformer does not have an electrostatic shield, replace it with one which has. Shielded transformers, in the RA-112A and RA-113 may be recognized by the fifth lead used to connect the shield to the case. In the RA-109A this lead is not visible unless the case is removed. The part number for electrostatically shielded and unshielded transformers is the same; however, shielded transformers will be supplied on all future orders.

- - -

Model RA-109A, Photofact Set 110, Folder 7

Symptom: Tuneable hum when Selector Switch is in Tele position and Tone control is set for maximum, or near maximum bass. 60 cycle ripple on AGC line. Hum disappears when Selector Switch is placed in FM position.

Probable Fault: AGC control not adjusted properly.

Remedy: Reset the AGC control.

* * *

Model RA-109A, Early Production
Photofact Set 110, Folder 7
Models RA-112A, RA-113, Photofact Set 119, Folder 5
Model RA-117, Photofact Set 131, Folder 5

Symptom: Low sensitivity and noise in the picture.

Probable Fault: Leaky coupling capacitor in video IF transformer. This occurs in transformers in which the wire forming one plate of the coupling capacitor is uncoated.

Remedy: Replace the transformer with type having coated capacitor wire or remove capacitor wire and connect a 1.5 mmf. ceramic capacitor across the upper ends of the transformer windings.

- - -

Symptom: Intermittent flashes and white streaks in picture, usually decreasing in intensity as the receiver warms up. Irregular, intermittent spikes appear in the composite sync signal, as observed on an oscillograph.

Probable Fault: Intermittent short in the 6J6 RF amplifier.

Remedy: Replace the 6J6.

* * *

Model RA-109A, Photofact Set 110, Folder 7
Model RA-119A, Photofact Set 156, Folder 5

Symptom: Hum in sound when the Volume Control is at minimum, and the Service Selector Switch is in the TV position. The hum level and volume level vary when the Brightness or Contrast controls are adjusted.

Probable Fault: Stray coupling between the video circuits and the first and second sound amplifiers.

Remedy: Replace the first and second sound amplifiers, V16 in RA-119A and V19 in RA-109A (12AU7). If this does not remove the hum, try placing a shield over the tube.

* * *

Models RA-112A, RA-113, Photofact 119, Folder 5

Symptom: No raster, no high voltage. When damper tube is removed, raster, with heavy foldover lines, appears. Raster varies in size, vertically and horizontally when setting of brightness control is changed.

Probable Fault: Breakdown of the .02 mfd. capacitor, Item No. C101.

Remedy: Replace the above capacitor with a 600 volt unit.

Note: 600 volt capacitors are used in all RA-112A and RA-113 chassis currently being produced. The change has been made in all RA-112A chassis starting with serial number 122432.

- - -

Symptom: Horizontal sweep synchronizes only after long warm-up.

Probable Fault: Low emission in the horizontal AFC and saw generator, V20.

Remedy: Replace the above tube.

- - -

Symptom: Poor Sensitivity.

Probable Fault: Mixer screen resistor, R13, in the Inputuner has changed value. Proper value is 150K.

Remedy: Replace the above resistor.

- - -

Symptom: Setting of contrast control is critical.

Probable Fault: L31, in the grid circuit of the video amplifier (V9) is open.

Remedy: Replace L31.

- - -

Symptom: Fine tuning or fine and coarse tuning knobs cannot be turned or are difficult to turn at one point in each rotation. In some cases the Receiver does not tune as the vernier knob is rotated.

Probable Fault: The tuner dial assembly vernier gear is split.

Remedy: Replace the assembly shaft and vernier gear. Instructions for the replacement are included with the part. The part number is 30026441.

- - -

Symptom: Microphonic noise in picture and sound.

Probable Fault: The stator plate of trimmer capacitor C33 in oscillator circuit of the tuner is loose.

Remedy: Apply a hot soldering iron to the top of the stator terminal, as shown in Figure 4A. The chassis

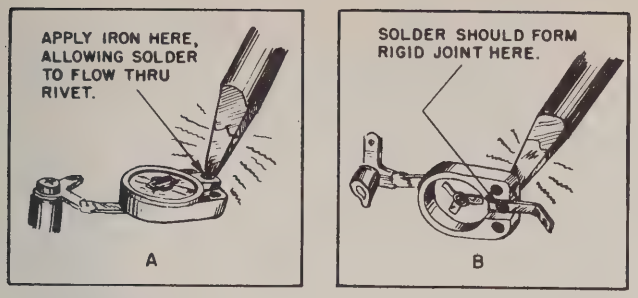


Figure 2

should be turned upside down and a small amount of additional solder applied, if necessary, so that solder will run down through the center of the rivet and form a rigid joint between the stator and the terminal, as shown in Figure 2B.

- - -

Symptom: Loss of horizontal sync.

Probable Fault: C90 at the grid of the horizontal AFC tube, V20 is leaky.

Remedy: Replace capacitor. Since leakage resistance as high as 300 megs. will cause this symptom, the most dependable method of checking the capacitor is by substitution. Use only an exact replacement part.

- - -

Symptom: Horizontal pull. The AGC and Narrow-Band-Sync adjustments will not correct the trouble. The plate and screen voltage of the sync clipper, V17, is higher than normal.

Probable Fault: R113, the 2.4 5% B+ bleeder resistor, is open.

Remedy: Replace R113.

- - -

Symptom: Horizontal "S" distortion of the picture. Excessive 60 cycle ripple in negative line of power supply.

Probable Fault: Heater-cathode leakage in 6BG6, V21.

Remedy: Replace V21.

* * *

Models RA-112A, RA-113, Photofact Set 119, Folder 5
Model RA-117A, Photofact Set 131, Folder 5

Symptom: No picture. Raster varies in brightness from top to bottom forming a wide dark band. When Selector Switch is placed in the FM position, raster remains on screen but is not in sync. In some cases the picture will appear and disappear rapidly when switch is in Tele position.

Probable Fault: Heater-cathode leakage.

Probable Fault: Heater-cathode leakage in the CRT.

Remedy: Replace the CRT.

Symptom: Audio in picture when Volume Control is at maximum or near maximum.

Probable Fault: Defective 10 mfd. section in C3 in RA-112A and RA-113 and C2 in RA-117A.

Remedy: Replace C2 or C3.

- - -

Symptom: No raster, no high voltage. When damper tube is removed, raster, with heavy horizontal fold-over appears.

Probable Fault: C102 in RA-112A and RA-113 and C104 in RA-117A, the .5 mfd. capacitor is defective.

Remedy: Replace capacitor.

- - -

Symptom: Vertical foldover in lower half of picture. Vertical hold control adjustment very critical. After careful setting of the vertical hold control picture will roll occasionally.

Probable Fault: C86, the .01 mfd. 5% 400 volt condenser in the vertical oscillator circuit is leaky.

Remedy: Replace C86.

* * *

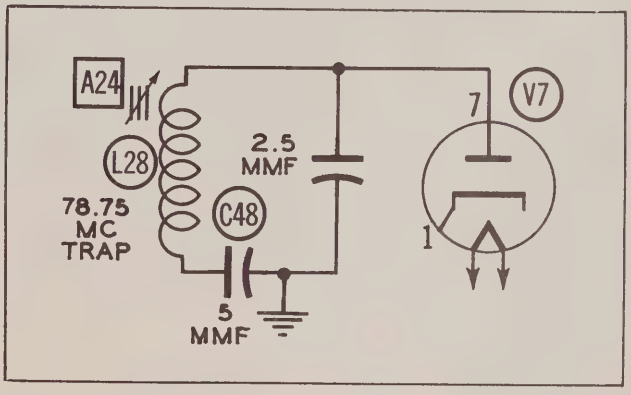


Figure 3, RA-117A, Selectuner

Model RA-117A, Photofact Set 131, Folder 5

Symptom: Channel 8 beat. Fine diagonal lines in picture, changing in frequency as fine tuning is varied. Condition occurs in channel 8 areas in those Models in which a channel 5 trap has been installed.

Probable Fault: The seventh harmonic (183.75) of the video if (26.25) combines with the video carrier of channel 8 (181.25) to produce a 2.5 mc beat.

Remedy: Connect a 2.5 mmf. capacitor from pin 7 of the video detector to ground as shown in Figure 3.

* * *

Re-Calibrating the RA-117A Tuner

Aging of components or replacement of the oscillator tube in the Selectuner may cause the proper tuning point, for each channel, to fall out of the range of the

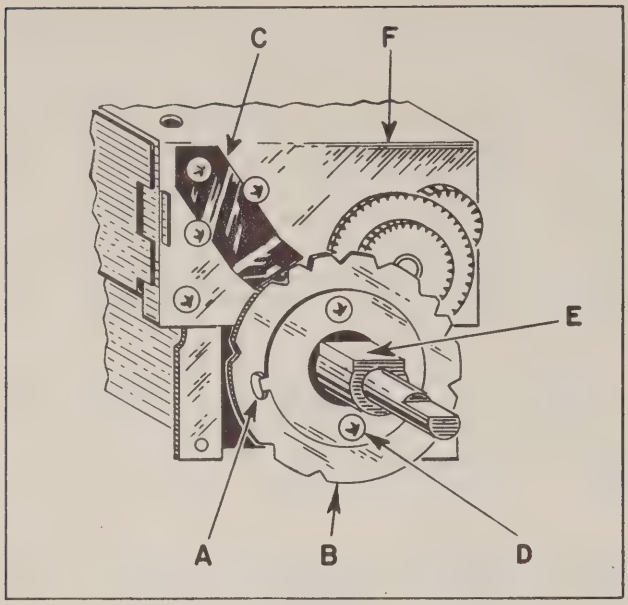


Figure 4

detent. When this condition is encountered, the following procedure should be followed to correct it:

1. Turn the Receiver on and tune it to the highest channel in use in the area in which it is installed.

2. Remove the tuning knob and the channel indicator dial and readjust the tuning until proper tuning indication is obtained.

Caution: Do not carry or tune the Selectuner using the channel indicator dial.

3. Observe the position of the detent for the channel to which the Receiver is tuned, with respect to the detent spring, C in Figure 4. The detent spring should be centered in the proper detent.

Note: With proper calibration the clutch stop (A) will not necessarily be centered when the Receiver is tuned to channel 9. Therefore, it is not advisable to use this channel as reference.

4. If the position of the detent is incorrect, loosen the two Phillips screws (D) on the front of the clutch disc one-half turn; while holding the detent disc in position.

Caution: Do not disturb the Phillips screws fastening the top section of the Selectuner to the Inductuner.

5. Rotate the detent disc until the detent spring is centered in the proper detent.

6. Rotate the clutch disc until the stop is centered in the slot, when the tuning indicator shows proper tuning.

7. Tighten the two Phillips screws and make a final check of the dial calibration on all stations.

If it is impossible to obtain proper calibration on all stations using the above procedure, the oscillator tracking adjustment may be off or the gear train in the tuner may have been damaged. A quick check of the calibration may be made by tuning to channel 13. If the gear train is properly engaged and the calibration is approximately correct, the flat (e) on the shaft, extending through the detent disc, will be up and approximately parallel with the top of the chassis (F). Damage to the gear train can result if the channel indicator dial is used as a knob. The gear train in the Selectuner is sturdily constructed and will give long, trouble-free performance in normal usage; however, some possibility of damage to the gear train exists if sufficient turning force is exerted on the channel indicator dial.

- - -

Symptom: Picture cannot be focused, raster size reduced and cutoff.

Probable Fault: 900 ohm section of R116 open.

Remedy: Replace R116.

- - -

Symptom: Microphonics in sound.

Probable Fault: The oscillator tube (V2) shield is loose or the oscillator tube is microphonic.

Remedy: Tighten the shield, if this does not correct the condition, try another tube.

- - -

Symptom: Low sensitivity. The symptom may occur on the high band and the low band simultaneously, or on one and not the other.

Probable Fault: The Allen-head screws in the fiber form on which the RF coils of the Inputuner (L6 and L5) are mounted are loose, and the form is not rotating properly. L6 and L5 are mounted on a small fibre form which is free to rotate and is coupled to the gear train by a small metal shaft. Two Allen-head screws fasten the form to the metal shaft so that it rotates with the shaft.

Remedy: Remove the tuner from the main chassis and take off the tuner bottom-cover plate. Remount the tuner on the main chassis. Tune the Teleset to a high channel station, rotate L6 and L5 until optimum sound and picture are obtained and tighten the Allen-head screws. When tightening the Allen-head screws, care should be exercised to avoid stripping the threads or cracking the fiber form. Check the tuner on all available channels. It may be necessary to make a slight readjustment of the coils to secure optimum performance on all channels. When the adjustment has been completed, remove the tuner, replace the bottom cover and remount the tuner on the main chassis.

The PHOTOFACT Servicer

April 1, 1952 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ Vol. 17, Nos. 165 & 166

FACTORY SERVICE HINTS

The following Service Hints covering Stromberg-Carlson Television Receivers are brought to you through the courtesy of Stromberg-Carlson Company.

Model 17 and 116 Series Receivers
Photofact Set 135, Folder 12

Smoothing the Tuning Dial Action

Jumpy or sticky operation of the tuning dial is often traceable to roughness in the slotted tracks of the upright portions of the tuner unit and to greater tension than necessary on the two flat springs in this same location. This condition has been corrected in factory production and field cases can be remedied by inserting a flat instrument under the flat springs and bending them outward to relieve the spring tension and binding action. The use of Lubriplate 105 as a lubricant between these springs and the bearing surfaces of the upright brackets will also smooth the tuning action.

Securing Ganged Cores in Tuner Carriage

The powdered iron cores, mounted in the movable carriage of the tuner unit, are being held in position after aligning adjustments by a rubber cement compound applied at the junction of the adjusting screw body and the supporting rubber grommet. Speed nuts were previously used in this position. If these core positions are changed with respect to the carriage, they should be re-cemented in place.

Model TC19 Receivers
Photofact Set 97, Folder 17

Horizontal Instability

In some areas, horizontal jitter and picture pulling has been observed when the incoming signal has lower than normal sync-pulse levels. Receivers in these areas have been modified to improve this situation by increasing the value of the R71 resistor from 270,000 ohms to 470,000 ohms. The R71 resistor connects between pins 2 and 3 of the V13A, 12AU7, Sync Clipper and D. C. Restorer Tube.

Horizontal Frequency Control

The C100 capacitor, from the No. 2 pin of the 6AL5 horizontal phase detector to ground, should be a .022 value (Part No. 110557) instead of a .01 mf. value. Some chassis were manufactured using the .01 mf. value, and if receivers are encountered where the horizontal oscillator suddenly shifts to half frequency and cannot be returned to normal with the control, placing another .01 mf. capacitor in parallel with the .01 mf. capacitor in the C100 position will usually remedy the trouble.

Poor Picture Contract and Poor Picture Holding

When a poorly contrasted, washed-out picture and poor picture holding develops on one of the subject receivers after the receiver has been in operation for a period of time, the cause has often been traceable to increased resistance value of the R69 and R70, 1500-ohm, 2-watt resistors in the plate circuit of the video amplifier. The resistors will measure about 1000 to 2000 ohms high and will usually have a burned, discolored body if this condition has developed.

Critical Horizontal Hold Control

Many cases of critical horizontal hold in TC19 receivers, have been traced to a change in value of the R59, 15,000 ohm resistor from the screen of the 6AU6, 1st video amplifier to ground. It is recommended that this half watt resistor be replaced with a one watt value if this condition is traced to this resistor.

Vertical White Streaks on Right Side of Picture

The condition of vertical white fold lines on the right side of the picture can usually be corrected by replacing the 100 ohm parasitic resistors (R116 and R120) in the grid circuits of the two 6BG6 Horizontal Sweep Output Tubes.

* * *

Model 24 Series, Photofact Set 138, Folder 11

Strengthened Picture Tube Mounting

Early field reports indicated instances where severe transportation treatment had caused the metal brackets supporting the picture tube mounting shelf to pull loose from the top of the cabinet during transit. This caused the picture tube assembly to drop down onto the main chassis resulting in numerous cases of tube breakage. This supporting method has been revised and the assembly strengthened so as to be capable of withstanding more severe transportation treatment. The new assembly method consists of the use of No. 8, 5/8 inch, PK type screws in place of No. 8, 5/8 inch, wood screws for mounting the metal supporting brackets. These screws give greater purchase than wood screws. In addition, two No. 8, 1-1/4 inch, wood screws, one on each side of the tube bracket, are now being used thru the tube shelf itself into the cabinet top. These two screws will have to be removed to take the tube shelf from the cabinet.

Adjustment of the Horizontal Drive and Linearity

Adjustment of the horizontal drive and linearity for proper picture on the subject receivers should be made in the following manner to obtain correct results:

1. Back the horizontal linearity iron core all the way out.
2. Adjust the horizontal drive trimmer capacitor for a slight overdrive fold line in the center of the picture.
3. Now adjust the horizontal linearity core inward for proper linearity and the fold line should disappear simultaneously.
4. Slight readjustment of the drive and linearity controls may be necessary.

High Voltage Value

Measurement of the anode voltage (high voltage) should be made with the receiver operating at 117 A. C. line volts with the brightness control set at minimum brightness position. Under these conditions, the "high voltage" should not exceed 17.5 KV nor be below 14 KV.

* * *

Model 24 Series, Photofact Set 138, Folder 11
Model 119 Series, Photofact Set 130, Folder 14

High Voltage Breakdown Preventative

To prevent breakdown between the 6BG6 plate leads and chassis, rubber grommets have been inserted in the chassis holes where these plate leads feed through, and additional sleeving has been added over the lead itself.

Greater Contrast Availability

To increase the contrast availability of these receivers, the R54, 220 ohm resistor in the cathode of the 6AR5 Video Amplifier can be shorted out. This permits greater action of the contrast control.

* * *

Model 119 Series Receivers
Photofact Set 130, Folder 14

Improved Picture Focus

The action of the Focus Control has been improved by removing the R131, 4700 ohm resistor which shunted the focus potentiometer and the R130 series resistor. This change allows proper picture focus to be obtained nearest the mid-range of the focus control. The beam spot on the picture tube screen has been reduced in size to improve the overall in-focus picture area by raising the voltage supplied to the kinescope screen. This voltage increase has been accomplished by disconnecting the screen lead from video amplifier screen supply point and re-connecting it through a 100,000 ohm resistor to the Boosted D. C. Voltage that appears at the No. 3 terminal of the Horizontal Output Transformer. The screen side of the 100,000 ohm resistor is by-passed to ground with a .01 mf. capacitor (S-C Part No. 110568).

Model 317 Series Receivers
Photofact Set 146, Folder 10

Tuner Information

The length of the "red", "yellow" and "blue" leads from the tuner assembly to the chassis have been shortened in production to prevent them from obstructing the vernier action of the tuner. Also, the fiber nut and the brass bushing in the vernier assembly section are being more freely lubricated to smooth the vernier action. Tuners should not require more than 15 inch-ounces of torque to operate the vernier.

Extreme care must be exercised in the field in returning this fiber nut to its original position if for any reason the vernier section has been disassembled. If care is not used the tuner will have to be recalibrated but if the vernier has been turned to its maximum clockwise position before disassembling and left in that position, no trouble should be encountered.

The vernier action of these tuners on current production consists of two full turns. The vernier action for each channel can be centered by adjusting the cam screw which is accessible from the front through the open hole in the tuner front disc plate. One extra hole in this disc plate has been taped over to prevent its being used for setting up these channel cam screws.

Recent production employs an aluminum bushing in place of a fiber bushing in the vernier section, to minimize wear failures. Service replacements of this part from the factory will be of the aluminum type.

Anode Lead Breakdown Protection

To reduce the possibility of breakdown between the high voltage anode lead and chassis, a grommet (S-C Part No. 131013) has been inserted in the chassis at the point where the anode lead leaves the high voltage case.

Removal of Horizontal Size Potentiometer

On all receivers date coded 51-32 and later, the Horizontal Size potentiometer has been removed from the circuit and the Horizontal Size Coil has been repositioned to the rear chassis flange so as to be accessible for adjustment from the rear of the receiver.

Vertical Hold Control Range

The value of resistor R85 in series with the vertical hold potentiometer, has been reduced in value from 1 megohm to 680,000 ohms (S-C Part No. 149118). This reduced value permits the hold range to be better centered within the control.

Improved Fringe Area Performance

The R. F. tube in the tuner unit is specified as either a 6AG5 type or a 6BC5 type. Either type can be used in this position because they are interchangeable; but the 6BC5 type does have higher gain. Where the 6AG5 type has been used in this position, and higher gain is desired such as in fringe areas, the 6BC5 type can be used and the higher gain achieved.

Mask Breakage

Excessive breakage of the plastic mask during

early shipments was reported from the field on the subject receiver series. To correct this condition receivers or recent production use a more pliable plastic mask that is capable of with-standing severe shock treatment. This new mask looks the same as the former type except that the rear surface of the mask is now black instead of being brown colored overall. To date, this stronger brown mask with black-rear-surface has proven a satisfactory solution to the mask breakage problem.

High Voltage Value

Receivers operating normally should deliver, to the second anode of the picture tube, a minimum of 13.5 KV. at a line voltage of 117 volts, with the brightness control fully counter-clockwise (off position). At a line voltage of 110 volts this voltage should be at least 12.7 KV. under the same operating conditions.

Correcting Loss of Horizontal Size at Maximum Brightness

Loss of horizontal picture size, as the brightness control is advanced to maximum, has been corrected in 317 Series Receivers by increasing the value of R49 from 150,000 ohms to 270,000 ohms (New S-C Part No. 28194). This resistor connects the picture tube cathode to the tap arm of the brightness potentiometer.

* * *

Model 321 Series Receivers
Photofact Set 156, Folder 1A

Lead Dressing in High Voltage Power Supply

To avoid arcing, certain precautions must be observed in dressing the lead wires in the high voltage power supplies when servicing these sections of the subject receivers. These precautions are as follows:

1. The insulated lead from the flyback transformer to the 1B3 rectifier plate cap must be dressed clear of the 6W4 damper tube envelope by running it midway between the 6W4 and 6AU5 tubes. If there is any excessive length, the 1B3 plate cap can be turned slightly so that the lead falls to the rear of the 6W4 toward the 1B3 supporting board.

2. The white and red leads, from Terminals 5 and 6 of the 6W4 socket to the fuse, must also be dressed clear of the 6W4 envelope.

It is important that these precautions be observed when replacing 1B3 tubes on 6W4 tubes in the field. It will be observed that the glass envelope on 6W4 tubes varies in length and that there is less possibility of arcing if the shorter envelope 6W4 tubes are used in these receivers. Destruction of the 6W4 tube will occur if substained arcing is permitted between the 1B3 plate lead and the 6W4 envelope.

All Current Receiver Models

Failure of the Bifilar I. F. Coils

Some failure of the Bifilar I. F. Coils (S-C Part No. 114376 and 114382) have been reported from the field where the primary and secondary windings short together under high humidity and temperature or excessive dampness conditions. Examination of these failures reveals that in most cases open bubbles in the nylon wire insulation has permitted moisture to be absorbed by the nylon insulation, thus causing breakdown between primary and secondary windings.

Present production of these coils using nylon insulated wire are being wax-impregnated to effectively seal off the windings against moisture. I. F. coils are also being used with FORMVAR, a varnish insulated wire, which are satisfactory without the wax-impregnation.

Precaution

Both the EM-PM and PM type focus assemblies used on current receivers can easily be damaged if proper care is not exercised in handling them both within the receiver and in parts stock.

A slight jar or striking with a metallic tool may cause the assembly to lose its magnetism thereby affecting its focusing ability. When working on the receiver chassis, extreme care should be used to prevent damage to the focus assembly. In making any adjustments of this assembly, it is advisable to use a brass or non-metallic screw driver.

When storing these assemblies in parts stock, they should not be left in contact with each other or permitted to rest on metal shelves nor should they be subjected to serious jars or vibration.

* * *

FIELD EXPERIENCES -

For every "Field Experience" published, we issue a certificate good for one PHOTOFACT Folder Set. Awards are issued at the time of publication. Since it is impossible to verify the accuracy of contributions, we cannot be responsible for either the diagnosis made of the receiver trouble, or the results which will be obtained by following the suggested repair routine. All contributions become the property of Howard W. Sams & Co., Inc.

MOTOROLA TV Model 16K2H
Photofact Set No. 121, Folder 10

Complaint: Sound okay - no picture.

Analysis: By turning the channel switch to a position where no station exists, the raster appears and is normal.

Remedy: Replace defective horizontal phase detector tube, Item V15.

Richard Todd
1850 South Street
Portsmouth, Va.

* * *

BENDIX Model 3001
Photofact Set No. 84, Folder No. 4

Complaint: Terrific hum as volume is increased.

Analysis: Vertical output transformer, Item T3, in reversed mounting position as shown in Photofact

Folder, pages 4 and 9. Hot plate lead near audio lead to 6T8.

Remedy: Reversed position of transformer and hum was gone. Also dressed hot plate lead to chassis.

* * *

EMERSON TV Model 66B
Photofact Set No. 133, Folder No. 5

Complaint: No sound or picture.

Analysis: Osc. plate resistor, Item R16, cracked, removing plate voltage from tube V2 pin #1.

Remedy: Replaced resistor, used less tension of leads on replacement.

Editor's Note: Both above Experiences were contributed by -

J. W. Smith
The Radio Shack
1602 W. Pratt Street
Baltimore, Md.

* * *

CROSLEY Model 9-102
Photofact Set No. 50, Folder No. 4

Complaint: Distorted sound on all stations.

Cause: Short in hum bucking coil caused by rubbing against pole piece.

Remedy: Replace speaker.

GENERAL ELECTRIC Model 805
Photofact Set No. 78, Folder No. 7

Complaint: Raster intermittent. Sound normal.

Cause and Remedy: Loose cap connection on 19BG6. Resolder connection.

Editor's Note: Both above Experiences were contributed by -

Mr. George E. Mead
248 North Street
Hingham, Mass.

* * *

RCA VICTOR Model 9TC272
Photofact Set No. 85, Folder No. 13

Complaint: No high voltage. Fuse, Item M6, open.

Analysis and Repair: Circuits checked okay with ohmmeter. Fuse replaced and set operated normally. Fuse opened again following day when set was turned on. Trouble caused by faulty 6BG6G. Replace 6BG6G.

Mr. Williard W. Mott
S & M Television & Radio Service
P.O. Box 376
Somerville, New Jersey

RCA VICTOR Model 8X71
Photofact Set No. 63, Folder No. 15

Complaint: Severe distortion on FM.

Cause and Remedy: Cathode to heater leakage on ratio detector tube, 12AL5. Replace tube.

Mr. Paul S. Segars, Jr.
107-6th Street
St. Petersburg, Florida

* * *

RAYTHEON Model C-1401 (Ch. 14A X 21)
Photofact Set No. 123, Folder No. 12

Complaint: No raster, sound okay.

Analysis: With Damper tube, 6W4, removed, small raster appeared. No high voltage with 6W4 in socket. Check of parts revealed 10K ohm, 2 watt resistor, Item R101 had changed in value to 300 ohm.

Repair: Replace resistor.

Mr. John R. Bulling
John's Home Appliance Service
327 W. Apple Street
Hastings, Michigan

* * *

CROSLEY Model 10-404
Photofact Set No. 114, Folder No. 3

Complaint: Unstable horizontal sync.

Cause & Remedy: Shorted C56 or C57, Sync coupling capacitors. Replace with recommended units.

Mr. V. J. Paradise
Vi-Ann Electronic Lab.
Phildelphia, Pa.

* * *

CHEVROLET Model 986515
Photofact Set No. 149, Folder No. 5

Complaint: Set dead in center portion of dial. Crackling and popping noise similar to shorting variable. Set is slug tuned.

Analysis: Pointer pivot arm which rides up and down directly underneath dual trimmer (A5 and A6) rises at top of travel so that it touches lug connections on underside of trimmers.

Repair: Bend A5 and A6 mounting bracket up to clear arm or insert washers under 2 screws which mount bracket.

Mr. Donald Dee Waltner
Box 93
Waltner Electric
Moundridge, Kansas

The PHOTOFACT Servicer

March 15, 1952 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ Vol. 17, Nos. 163 & 164

NEW PARTICIPANTS

We are pleased to announce the addition of two well-known product listings in PHOTOFACT Folders.

Federal Telephone and Radio Corp., 900 Passaic Ave., East Newark, N. J., manufacturers of selenium rectifiers will have listings beginning with PHOTOFACT Set No. 164.

Bussman Manufacturing Co., University at Jefferson, St. Louis, Missouri, manufacturers of fuses and fuse holders will have these products listed beginning with PHOTOFACT Set No. 166.

* * *

FACTORY SERVICE HINTS

The following Service Hints covering Stromberg-Carlson Television Receivers are brought to you through the courtesy of Stromberg-Carlson Company.

Model 16 Series, Photofact Set 135, Folder 12

High Voltage Adjustment

The potential to the second anode of the kinescope tube is carefully adjusted at the factory so that it does not exceed 12.5 kilovolts at a line voltage of 117 volts. At the same time the picture is observed for correct width with no fold-over.

Precautions should be observed when making any adjustments of the B2 horizontal drive capacitor to the 6BG6 grid so that the high-voltage does not exceed the specified 12.5 kilovolts at normal line voltage. If this "high-voltage" is permitted to rise appreciably above this 12.5 kilovolt value, corona and arc-overs will take place in the high-voltage supply with resultant damage to the parts.

Precautions should also be observed when replacing parts or tubes in the high-voltage supply. The following suggestions may prove helpful in minimizing corona and arc-overs in this supply:

1. All soldered joints should be rounded off with no sharp solder or sharp wire points for corona discharges.

2. Leads should be dressed away from ground points, tube envelopes and separated from each other.

3. Insert 6BG6 tubes so that the glass envelope does not come closer than 1/4" to terminal No. 11 on the horizontal output transformer.

4. Be sure the caps to the 1X2 tubes are not upside down with sharp edges toward the case and be sure there are no sharp wire points on leads to 1X2 caps or on leads to 1X2 filaments.

* * *

Model 16 and 116 Series
Photofact Set 135, Folder 12

Increased Frequency Stability of the Horizontal Sweep Oscillator

The R104 Resistor in series with the B plus supply lead to the No. 5 pin of the 6SN7GT (V20) Horizontal Sweep Oscillator Tube has been increased from 2200 ohm, 1 watt value to 8200 ohm, 1 watt value (SC Part No. 37200). This increased value lowers the voltage on the No. 5 pin about 50-75 volts with increased stability of this oscillator section. Also, 8200 ohm, 2 watt resistors (SC Part No. 120954) or 10,000 ohm, 2 watt resistors (SC Part No. 149276) are permissible substitutions in this position.

Resistors in High-Voltage Supply

The 116 Series Receivers employ four special 680,000 ohm resistors in series in the voltage doubler section of the HV supply. (Physically these resistors are located on a terminal board between the 1X2 tubes.) The 16 Series Receivers only employed three of these resistors in series and some field failures have been reported where corona has burned and discolored the body of the top resistor and increased the actual resistance value to a point where the brightness control causes excessive picture "blooming"

When servicing 16 Series Receivers for this reason, it is recommended that four instead of three special 680,000 ohm, 2000 volt type BTAV resistors (SC Part No. 149368) be used to reduce the stress on each resistor and to minimize possible recurrence of this failure.

* * *

Models 16, 17, and 117 Series Receivers
Photofact Set 135, Folder 12

Horizontal Picture Pulling or Kinking

Recent field reports suggest that horizontal picture pulling, picture kinking, and critical action of the horizontal hold control can often be corrected by replacing the 6AH6 tube in the 4th I.F. stage. Other than these symptoms, the operation of the faulty 6AH6 tube appears normal.

Models 16, 116 and 17 Series Receivers
Photofact Set 135, Folder 12

Model TC125-"O", Photofact Set 95A, Folder 13

Horizontal Picture Pulling or Jittering

Horizontal picture pulling, jittering, or wavering, occurring regardless of contrast control settings, can in most cases be corrected by inserting a .47 mf. capacitor (Part No. 110709) across the 10 mf. (C7) capacitor that bypasses the A.G.C. line to ground. The 10 mf. electrolytic capacitors do not all have adequate high-frequency by-passing action which is provided by the .47 mf. capacitor. The pulling effect is more pronounced with strong signal reception and in many cases might be mistaken for overload, but the capacitor addition corrects it.

Improved Vertical Hold Control Action

The action of the vertical hold control can be "stiffened" by inserting a 10,000 ohm, 1/2 watt resistor across the secondary (Plate Winding) of the T2 Vertical Blocking Oscillator Transformer. This resistor dampens out ringing which might interfere with proper synchronization. Current receiver models have been modified accordingly.

* * *

Model 17 Series Receivers
Photofact Set 135, Folder 12

Picture Tube Protection

Some 17AP4 and 17BP4 kinescope tubes have enlarged glass envelopes. Since the enlarged portion of the envelope comes close to the metal chassis edge in subject models, strips of rubber are being cemented to the chassis at this point to act as protective bumpers. When replacing a picture tube with one of the newer enlarged envelopes, it is recommended that rubber strips be inserted as protective bumpers if the chassis is not so equipped.

Buzz or Whistle in High-Voltage Power Supply

Advice from the field indicates that cases of buzz or whistle in the high-voltage power supplies on these models can often be traced to vibration of the bakelite terminal board on the horizontal output transformer when S-C Part No. 161040 is used. These cases can usually be cured by tightening the long brass screw which clamps the assembly together. Apparently with age, the rubber washers used in assembly change resilience and allow the terminal board to become resonant at about 7 kilocycles.

Loss of Frequency Stability of Horizontal Sweep Oscillator

If the frequency of the 6SN7 Horizontal Oscillator appears unstable with a tendency to lock-in at half-frequency where two complete pictures are displayed side-by-side with a black blanking bar running vertically between the two pictures or at least with the oscillator running at an audibly lower frequency accompanied by a narrow raster with fewer than normal raster lines, the trouble is usually traceable to the R103, 270,000 ohm resistor in the No. 2 plate circuit of the 6SN7 tube. Resistors of a certain manufacture had a tendency to increase their value up to 1 megohm in this position, causing this condition. Use of this brand of resistors has been discontinued in production and this resistor should be replaced when this condition occurs in the field.

Too Large Vertical Picture Size

To permit the vertical size to be reduced sufficiently within the range of the vertical size control, the supply voltage to the vertical oscillator is no longer taken from the boosted D. C. but is now taken from the 410 volt, B plus line.

Circuit-wise, the R91, 2.2 megohm resistor is disconnected from the boosted D. C. and reconnected to the 400 volt, B plus.

It is recommended that this revision be made in the field, if the vertical size cannot be reduced sufficiently with the size control.

Brightness Cannot be Diminished with Brightness Control

When it is impossible to diminish the screen illumination with the brightness control, the cause is often in failure of the R62, 220,000 ohm, 1/2 watt resistor connected in series with the brightness potentiometer. In such cases, replacing the resistor corrects the condition.

Improving Interlace

Under some conditions it may be difficult to obtain and maintain good interlace by adjustment of the vertical-hold control. When this condition is encountered, improvement can be obtained by shorting out the R92, 10,000 ohm resistor, in the vertical sweep circuit, permitting the C88, .033 mf. capacitor to return directly to ground.

* * *

Models 17 and 116 Series Receivers
Photofact Set 135, Folder 12

High-Voltage Corona and Arcing

When corona buzz, sometimes accompanied by the smell of ozone, is present on the subject receivers using all-glass picture tubes, the cause is often traceable to corona discharge between the terminal connector on the high-voltage anode lead and the glass area around the high-voltage pin on the kinescope tube. To correct this condition, which is most noticeable under high humidity or dampness conditions, the glass area immediately around the pin connector on the tube should be cleaned with carbon tetrachloride. The soldered joint on the anode lead terminal should be smooth without any sharp points and it may be necessary to add a rubber cap completely over the connection to the tube. Current production of these receivers are being equipped with an anode lead with a rubber cap over the connector. As an extra precaution, the cleaned-off glass area around the tube pin can also be painted with Walsco Anti-Corona Lacquer - Catalog No. 195 or its equivalent.

The PHOTOFACT Servicer

February 15, 1952 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ Vol. 17 Nos. 161 & 162

BOOK REVIEWS

Television Engineering - 2nd Edition
by Donald G. Fink

McGraw-Hill Book Co., Inc.
New York 10, New York
721 pages - $8.50

As Editor of Electronics and Vice-Chairman of the National Television System Committee, the author has attained a recognized stature as an authority on all phases of television. This is the 2nd Edition of the book published 12 years ago as, "Principles of Television Engineering." Since the original work, television has come of age and the author has re-written all but 35 pages of the original. Some 200 pages of new material have been added, bringing the new book fully up-to-date in its practical coverage of the field - including color systems.

For technical workers who want to add familiarity with television engineering to their knowledge of radio engineering - for readers who want adequate self-training material for engineering jobs in television broadcasting and manufacturing plants - for college and technical students in this field - this book meets the need for grounding in the engineering and technical fundamentals of television.

The whole television process, from studio to receiver, is covered - soundly and clearly. Aspects peculiar to television technology, such as scanning and waveform analysis, illumination and colorimetry, and camera tubes and picture tubes, are treated in detail, starting from first principles.

As a well-written, thorough treatment of television, it is recommended for advanced study on the subject.

-W.D.R.

* * *

Radio and Television Receiver
Trouble-Shooting and Repair
by Ghirardi and Johnson

Rinehart Book Inc.,
232 Madison Ave., New York 11, New York
822 pages - $6.75

The book starts with an analysis of components, and reasons for their failure. A complete analysis of preliminary questions, observations and checks, static tests, dynamic tests and the intelligent combination of all these methods into a practical and direct-approach servicing procedure follows. Problems involved in servicing communications receivers, AC/DC receivers, battery-powered sets and television receivers are covered in other chapters.

Realignment of receivers is given complete treatment. Replacement problems for the most important types of receiver components are given in detail. Two final chapters cover servicing problems connected with record changers and recorders.

Whether an "old-timer" or a comparative beginner in the Service Field, the reader will find many points of information which will be of interest and help.

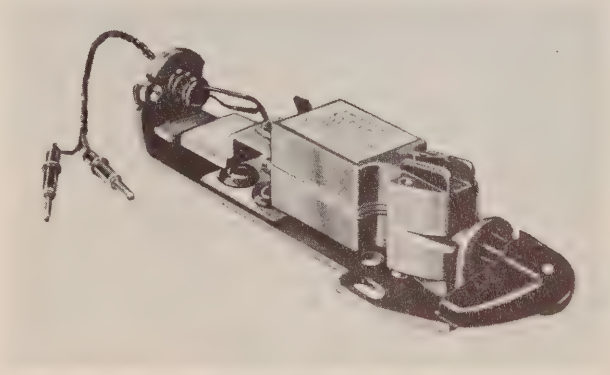
W.D.R.

* * *

TRADE NEWS AND INDUSTRY ITEMS

Astatic Announces Twin CAC-D Cartridge

The Astatic Corp., Conneaut, Ohio, has recently introduced a new turnover pick-up cartridge embodying two complete cartridge assemblies on a single plate. With his design, the ideal conditions for reproduction are established independently without the usual compromise between standard and long-playing requirements. A switching device is included between the cartridge in use and the standard pin connectors. A picture of the unit is shown herewith.



* * *

Jensen Back-Loading Folded Horn Blueprints Available

Jensen Manufacturing Company, Chicago, is offering without charge blueprints and instructions for building the new back-loading folded horn which was demonstrated in conjunction with the JENSEN G-610 TRIAXIAL loudspeaker at the AUDIO FAIR held in New York City recently.

This 30 cubic foot enclosure, developed by Jensen is of special interest to professional sound men and high fidelity enthusiasts alike since it is easily constructed of plywood panels at moderate cost.

Compactly arranged in a cabinet 5' X 3' X 2', this new horn design reduces loudspeaker resonant by almost one octave, increases efficiency 4 to 6 db over the entire piston range, improves transient performance and allows doubling the loudspeaker power rating for a given amount of distortion.

For further information write:
Jensen Manufacturing Company
6601 South Laramie Avenue
Chicago 37, Illinois

* * *

Sylvania Engineer Speaks on Color Status at the Ft. Wayne, Indiana Section of The Institute of Radio Engineers

Because of its timely interest we are presenting excerpts from a paper delivered by Dr. R. M. Bowie, Sylvania Electric Products Inc., entitled: "The Philosophy and Status of Compatible Color Television."

"There is emerging from the creative effort of engineers in the electronics industry a system of compatible color television. The exploitation of the properties of the human eye and brain required transcends that required in the monochrome service which it modifies.

"Monochrome television is a pleasing, acceptably imperfect, visual illusion of reality. It must convey information to the eye which the brain and eye together interpret easily as familiar concepts. To do this the illusion must be created by making use of subjective characteristics of the eye and brain.

"In the creations of the artist, one sees perhaps the earliest advantage taken of the eye's peculiarities in order to create a pleasing illusion. Certainly pictures do not contain true depth and most are notably lacking in detail, while the colors, under close examination often do not coincide with the boundaries of the object to which they belong. The exploitation of the eye's tolerance is carried to an extreme in the comic section of the Sunday paper. Here imperfections are grossly obvious, yet the pictures do create an illusion of special reality in color.

"In the newspaper half-tone, one sees the use of another limitation of the eye to create the illusion of contrast in the picture. Though the eye has considerable acuity for structural detail, there is a limit below which the detail blends and appears to have the average brightness and hue. Thus dots smaller than the limit of acuity are varied in size to produce picture contrast.

"Motion has been added by rapid superposition of pictures, taking advantage of the eye's insensitivity to flicker above a frequency which is roughly a logarithmic function of brightness. The motion picture industry has taken advantage of this by chopping the light 48 times a second even though but 24 frames per second are photographed. Thus the light is chopped once between frames and once again during the frame time without the film moving. There is an interesting teaching here. The eye is more sensitive to flicker in large, than in small areas. Obviously motion must cause a 24-cycle flicker in those fringe areas in successive pictures which do not superimpose, yet this low frequency flicker along edges is not visible.

"The peculiarities of the human eye of which the art has taken advantage in creating visual illusions of reality may be stated as follows:

1. The eye's acuity for contrast detail far exceeds that for chromaticity detail.

2. The eye's threshold of flicker perception is roughly a logarithmic function of brightness.

3. The eye's threshold of flicker perception is at lower frequency for large areas than for small areas.

4. The eye is much more insensitive to flicker in chromaticity than in brightness.

"The current intense activity on compatible color television springs from three main sources:

"First, the statement of the Federal Communications Commission, when it approved the field sequential system, that it would have preferred to adopt a compatible color system had there been such a system ready for commercial use and the repeated statements of members of the Commission to the effect that the door remains open for consideration of any compatible system, the feasibility and excellence of performance of which can be demonstrated.

"Second, what appears to be an almost unanimous desire within the industry for a compatible system which will not render obsolescent the existing 15 million receivers nor require the initial transmission of color programming to an infinitesimal audience. This desire is strongly evidenced by the unanimity of testimony on this point by industry engineers in the F. C. C. color hearings.

"Third, the apparent desire on the part of a large fraction of the electronic engineering profession to see adopted a system which does not require degradation of detail.

"Because it would seem certain that there must emerge a single set of compatible standards for presentation to the F. C. C., a non-exclusive body broadly representative of the engineering profession was indicated to coordinate the efforts of the various interested engineering groups. This body presently exists in the National Television Systems Committee of the Radio and Television Manufacturers Association, which was re-established by Dr. W. R. G. Baker at the time of the F. C. C. hearings on color. The N. T. S. C. was originally created at the unofficial request of the F. C. C. to develop and formulate a set of standards suitable for monochrome television. During the extended period of the color hearings, the eight Panels of the N. T. S. C. labored in getting together background information, but to no immediate avail as no standards for compatible color were developed for proposal and none were adopted.

"In recognition of the various opinions as to proposed specifications, an Ad Hoc Committee was formed by Dr. W. R. G. Baker on November 20, 1951. This Committee comprised initially engineers from, but not representing: General Electric, R. C. A., DuMont, Hazeltine and Philco. Shortly thereafter they were joined by Sylvania engineers. Its objective was to see if there were common ground among the systems being developed upon which to predicate a single compatible color system, and if so, to formulate a recommended plan and program."

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NEW PARTICIPANT

Ram Electronics Sales Company, Irvington-on-Hudson, New York to list TV Sweep Component replacements starting in PHOTOFACT Set 266.

CORRECTION NOTES

The Resistance Charts in PHOTOFACT Set 256 Folders 7 and 8 were interchanged.

The Resistance Chart for Folder 7, Bell Sound, Model 3D appears below.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	12AY7	† 125KΩ	10 Meg	0Ω	0Ω	12Ω	† 125KΩ	10 Meg	0Ω	6Ω
V 2	12AT7	† 105KΩ	470KΩ	1.5KΩ	52Ω	52Ω	† 150KΩ	0Ω	1.5KΩ	52Ω
V 3	12AX7	† 130KΩ	1.3Meg	133KΩ	52Ω	52Ω	† 100KΩ	200KΩ	2KΩ	52Ω
V 4	6V6GT	0Ω	52Ω	† 260Ω	† 1.5KΩ	270KΩ	INF.	52Ω	25Ω	
V 5	6V6GT	0Ω	52Ω	† 260Ω	† 1.5KΩ	270KΩ	2KΩ	52Ω	25Ω	
V 6	12AY7	† 125KΩ	10 Meg	0Ω	12Ω	25Ω	† 125KΩ	10 Meg	0Ω	18Ω
V 7	12AT7	† 105KΩ	470KΩ	1.5KΩ	52Ω	52Ω	† 150KΩ	0Ω	1.5KΩ	52Ω
V 8	12AX7	† 130KΩ	1.3Meg	133KΩ	52Ω	52Ω	† 100KΩ	250KΩ	2KΩ	52Ω
V 9	6V6GT	0Ω	52Ω	† 260Ω	† 1.5KΩ	270KΩ	2KΩ	52Ω	25Ω	
V 10	6V6GT	0Ω	52Ω	† 260Ω	† 1.5KΩ	270KΩ	INF.	52Ω	25Ω	
V 11	5U4G	INF.	50KΩ	INF.	35Ω	INF.	37Ω	INF.	50KΩ	

MEASUREMENTS MADE WITH M3 IN POSITION 4- ALL CONTROLS IN ZERO OR MINIMUM POSITION.
† MEASURED FROM PIN 8 OF V11.
■ MEASURED FROM GREEN AND YELLOW LEAD OF T2.

The Resistance Chart for Folder 8, Bell Sound, Models 2150, 2150R appears below.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	6SC7	0Ω	† 100KΩ	1 Meg	100KΩ	† 100KΩ	820Ω	.1Ω	.1Ω
V 2	6SN7	320KΩ	† 4KΩ	680Ω	320KΩ	† 4KΩ	680Ω	.1Ω	.1Ω
V 3	6L6G	0Ω	.1Ω	# 200Ω	† 430Ω	♦ 610Ω	♦ 340Ω	.1Ω	0Ω
V 4	6L6G	0Ω	.1Ω	# 200Ω	† 430Ω	♦ 610Ω	♦ 340Ω	.1Ω	0Ω
V 5	5U4G	INF.	0Ω	INF.	366Ω	INF.	366Ω	INF.	.1Ω
V 6	5V4G	INF.	25.5KΩ	INF.	110Ω	INF.	110Ω	INF.	25.5KΩ
V 7	5R4GY	INF.	25KΩ	INF.	55Ω	INF.	55Ω	INF.	25KΩ

♦ MEASURED FROM C4 NEGATIVE TERMINAL.
† MEASURED FROM PIN 8 OF V6.
# MEASURED FROM PIN 2 OF V7.

Photofact Set 230, Folder 8

The drive control should be adjusted to provide approximately -30 volts reading at the grid of the Horizontal Output Tube (6CD6). The Horizontal Linearity control should then be adjusted for minimum current through the 6CD6. Place VTVM across cathode resistor and adjust for minimum reading.

Photofact Set 256, Folder 11

The photograph of the cabinet on Page 1, showing the Olympic Model HF500, has the control callouts reversed. From back of cabinet to front they should read as follows: Tuning Control, Radio-Phono Switch, Volume Control and Off-On Tone Control.

FACTORY SERVICE HINTS

The following service hints covering Wells-Gardner Television receivers are brought to you through the courtesy of Wells-Gardner & Co., Chicago, Illinois.

Subject: Field Repair of 25A1105 UHF Tuner.

The following suggestions may be helpful when analyzing a tuner that has become weak in sensitivity or inoperative.

Both visual inspection and continunity of components should be made.

A penlite and dental mirror may be helpful in locating any defective components or poor connections in the oscillator compartment.

1. Shorted Turns IF Output Coil.
   Turns may be moved with insulated screwdriver while set is in operation on UHF to see if snow is reduced.

2. Shorting Bars Making Poor Contact on Tuned Lines.
   May be caused by mishandling when coupling or tuner shaft is attached to dial drive assembly.

3. Tube Socket Lugs Touching Each Other.

4. Defective Crystal.

5. Loose Connection in Crystal Holder (Poor Contact).

6. Defective 6AF4 Tube.

7. RF Choke Coils Open.

8. Tubular By-Pass Capacitor Broken.
   May be caused by excessive movement of 6AF4 tube in socket.

9. Solder Splashes or Loose Material in Oscillator Compartment.

10. Too Much End Play in Shaft.

11. Poor Contact or Loose Contacts in 6AF4 Tube Socket.

12. Disc Type Oscillator Plate Coupling Capacitor Open.

13. Oscillator B+ By-Pass Capacitor Shorted (68MMF).

FACTORY SERVICE HINTS

The following information appeared in the July-August 1954 issue of The Motorola Service News and is presented here through the courtesy of Motorola, Inc.

SERVICING MOTOROLA PLACIR CHASSIS

In May 1952, Motorola, Inc., announced the mass production and shipment of the first of a new method of wiring Home Radio receivers. This is the new PLACIR chassis.

Basically it is a system whereby the cumbersome and timeconsuming individual wire leads are omitted and the basic chassis, plus wiring are produced as a single unit via a patented plating process on a phenolic base.

The additional components to complete the circuits are then mounted on the top of the chassis base.

At first glance, it may appear that the introduction of this method would make servicing more difficult. Actually, it is just the opposite. Following the information given below, service time and effort is minimized.

Since the start of this type construction, many thousands of additional such sets have been manufactured and the service record is very gratifying.

Simple precautions should be followed in removind defective components from the chassis base, and to be most effective the following tools and accessories will further simplify servicing procedure.

1. A good pair of long-nose pliers.
2. Controlled temperature soldering Pot (Unit illustrated).
3. Low wattage soldering iron.
4. Cleaning fluid, such as carbon tetrachloride.

It is to be noted that servicing procedures on plated circuits involves; first, the problem of removal of defective components. This results from several components having 3 or 4 more terminals tying the item to the chassis wiring. The problem is to remove these components easily and quickly with no damage to the chassis base. This is best done by simultaneous heating of all the terminal of the component.

For this reason Motorola has developed a controlled temperature soldering Pot Part No. 66T632703, with a conveniently shaped top. Its size is such as to permit simultaneous heating of the multiple contacts of the component to be removed. Further, it will serve the normal purposes of a general utility soldering pot.

In preparing to remove a component, observe bottom of chassis base to see if terminals, of item being removed, are straight. If not, straighten prior to removal.

To remove carefully dip terminals affected into soldering pot as illustrated and with a gentle lift, the component will be unsoldered.

After removal of component, gently heat each chassis base terminal, of the component to be replaced, with the low wattage soldering iron to remove excess solder from base terminal holes, and any excess solder from the soldering pot that may be deposited on unaffected terminals. This will result in easy replacement of multi-terminal components since each terminal in turn may then be individually resoldered with a minimum of effort.

Clean the chassis base around the repair area with a suitable cleaner, such as carbon tetrachloride, before installing replacement part.

The soldering pot proves most effective because of uniform quick heating at a not too high temperature.

Use rosin core solder in the soldering pot, or be sure to flux before using. Deposit of residual rosin on base after these operations will no way impair circuit performance.

By observing the above procedures you will find it is possible to remove every component of chassis illustrated without lifting any of the wiring pattern. This includes tube sockets. In some cases it is necessary to lift one end of a component and then the other. to affect complete removal, but this poses no hardship.

You will find the easy accessibility, absence of hidden or crossing wires, or double decked components, more than makes up for the little extra precautions to be observed in servicing the Placir chassis. Further, with the exception of the tube sockets, resistors and small tubular capacitors, all components can easily be removed using only your hands and no tools, except the solder pot.

In case removal of a component results in damage to a conductor, repair may be easily affected by soldering a short piece of tinned wire to bridge the break.

Soldering Pot may be obtained from your local Motorola Distributor.

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FACTORY SERVICE HINTS

The following service hints covering RCA Victor receivers are brought to you through the courtesy of the Radio Corporation of America.

Models 3BX671, 3BX672 (Ch. RC-1125)
Photofact Set 228, Folder 14

DIAL CORD SLIPPAGE

If a condition exists on these radio receivers whereby the tuning knob fails to move the dial pointer it may be due to the dial cord slipping on its drive shaft. To remedy this condition wash the tuning knob shaft "hour-glass" with carbon tetrachloride and replace the tuning drive cord. It should not be necessary to replace the indicator cords. If this condition is not very severe it may be possible to apply sufficient solvent to the drive shaft without removing the chassis from the cabinet.

ADDITION TO PARTS LIST

The following item has been added to the replacement parts list under "MISCELLANEOUS". 79808, Cable — Two-conductor antenna cable assembly 72" long with three-prong male connector.

Models 2B400, 2B401, 2B402,
2B403, 2B404, 2B405 (Ch. RC-1114)
Photofact Set 181, Folder 10

TUNING CAPACITOR CHANGE

Late production of these models uses a tuning gang with an additional trimmer capacitor. This trimmer is connected across the antenna section of the tuning capacitor. In the alignment procedure this trimmer should be adjusted for maximum output at 1400 kc after the adjustment of the oscillator trimmer. The stock number of the new tuning gang capacitor is 79848.

Model 45EY3
Photofact Set 126, Folder 11

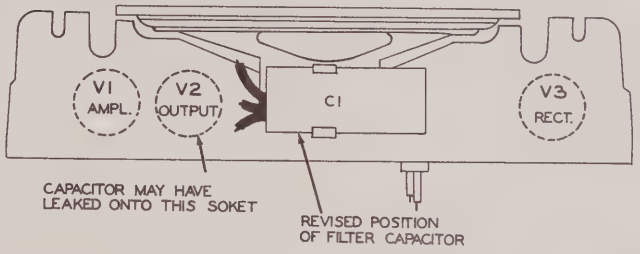
HUM OR NOISY AMPLIFIER

When this condition is encountered, the bottom of the output tube socket (50C5, 50L6GT or 25L6GT) should be observed for signs of leakage from the electrolytic capacitor. The lead end of this capacitor is normally directly above this tube socket.

Leakage from the capacitor onto the socket will establish an electrical leakage circuit between socket contacts. This electrical leakage may cause hum and corroded contacts will cause noise.

If there is any evidence of electrolyte leakage on the tube socket, the socket should be replaced and the capacitor repositioned. The capacitor may be repositioned by sliding it through its mounting clip toward the rectifier end of the chassis. The lead end of the capacitor should be even with the edge of the speaker magnet frame.

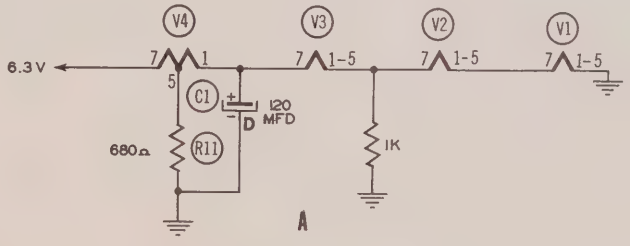
As a preventative measure, the electrolytic capacitor should be repositioned in this manner if service is required on the chassis for any reason.

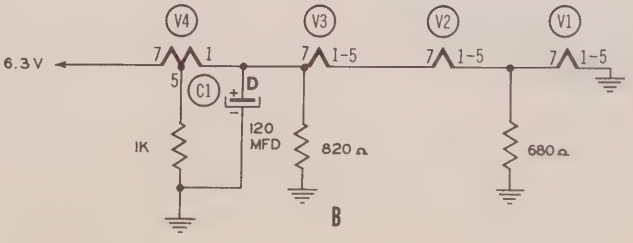


Models 3BX51, 3BX52,
3BX53, 3BX54 (Ch. RC-1126)
Photofact Set 227, Folder 11

FILAMENT WIRING CHANGE

Production of chassis RC-1126 series radio receivers have included two slightly different circuit arrangements as shown below. The circuit in figure "B" is that used in late production receivers.





Chassis KCS-81
Photofact Set 208, Folder 8

VERTICAL SYNC TROUBLES

The following changes are recommended to cure the various causes of vertical sync trouble not due to tube or component failure.

1. Poor Vertical Sync Due To Reflections

(1) Connect R90 to plus 350 volt bus.
(2) Change R91 to (4.7 megohms) to 1 megohm.
(3) Connect R106 to plus 170 volt bus.
(4) Change R109 and R110 (470 K) to 270 K.

2. Vertical Sync Compressed At The Transmitter

In all cases where this condition is suspected, the vertical sync should be checked at the second detector, video plate, and plate of vertical separator to see that the amplitude of the vertical and the horizontal sync are approximately the same. To overcome vertical trouble of this nature, make the following changes:

(1) Add 68 mmf, capacitor from grid (pin 7) of V10 to ground.
(2) Increase the value of R94 (27 K) to 68 K.

Make whichever one of the above changes gives the better results.

Chassis KCS-83
Photofact Set 242, Folder 8

VERTICAL SYNC TROUBLES

1. Vertical Sync Compressed At The Transmitter

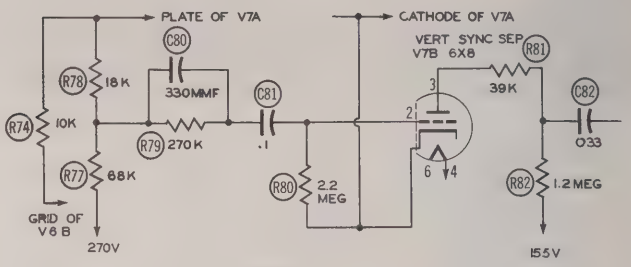
(1) Increase R78 (18 K) to 82 K.
OR
(2) Increase R77 (68 K) by adding 220 K in series with R77.
OR
(3) Add a 56 K resistor in series with C81 (0.1 mfd.) and junction of C80 (330 mmf.) and R79 (270 K).
OR
(4) Add 100 mmf. capacitor from junction R78 (18 K) and R79 (270 K).

Make only one of the above changes that results in best operation.

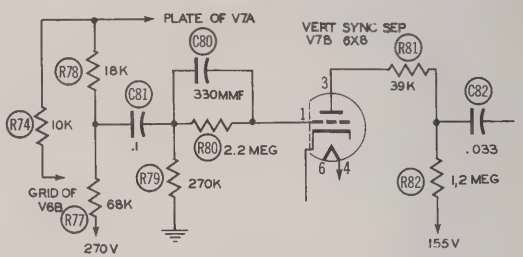
In all of the above changes, careful check should be made to determine if these changes cause any loss of interlace and/or picture degradation on strong signals. If these troubles are encountered, the values of the resistor changes in Items 1, 2, 3 above, should be decreased slightly and still accomplish a cure for the vertical trouble. In the case of the KCS-83 chassis the ratio of change in R78 and R77 should be the same.

2. To Minimize Loss Of Vertical Sync Due To Momentary AC Line Voltage Changes Or Very Low Frequency Noise

R79, R80, C80, and C81 are rewired as shown in the modified schematic diagram. For slightly better results the value of R79 may be changed from 270 K ohms to 180 K and R82 changed from 1.2 meg. to 1.8 meg.



ORIGINAL



MODIFIED

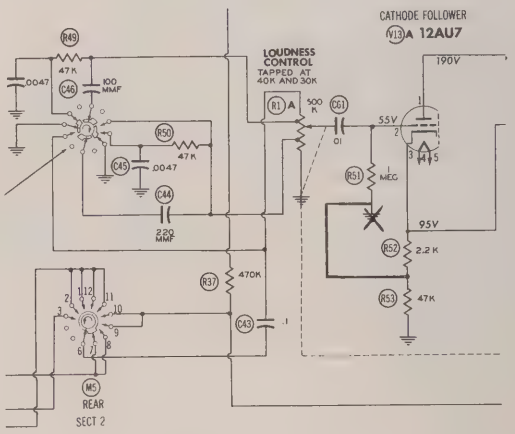
3. To Improve Vertical Hold

Change C89, .0027 mfd., capacitor to .01 mfd. This is the coupling capacitor located between the Sync Output and the Vertical Oscillator circuits.

CORRECTION NOTES

Fisher Model 70RT
PHOTOFACT Set 258 Folder 7

Correct grid circuit of V13A, Cathode Follower as shown below.



Hoffman Model 7B157
PHOTOFACT Set 254 Folder 6

Parts List, Page 16. Change International Part No. to RS-308SL and Mallory Part No. to 8S300 on Selenium Rectifier, M1.

RCA Victor Model CT100
PHOTOFACT Set 252 Folder 11

Change value of R240 to 47 K ohms.

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The following information on CDR Rotator Model TR-4 is brought to you through the courtesy of the Radiart Corporation, Cleveland, Ohio.

SERVICING OF THE CDR CONTROL BOX

ELECTRICAL SERVICE

Point to point DC resistance measurements on Control Unit.

IMPORTANT: AC power source must be disconnected.

Disconnect cable from control unit and check continuity at terminal strip at the back of the control box. Any accurate ohmmeter may be used, provided the current drawn by the instrument does not exceed 50 milliamperes. Damage to the meter in the control unit may result if a less sensitive ohmmeter is used. Check points, switch positions, and approximate DC resistance values are indicated below:

Terminals	Switch	Resistance
1-2 (Allow time for cap. to charge)	Center	Above 100-K ohms
1-4	Left	2 ohms
2-4	Right	2 ohms
3-4	Center	190 ohms
Line Plug	Left or right	14-16 ohms
Line Plug to Chassis	Left or right	Infinite

After both units have been re-assembled and Rotor unit mounted on mast, it will be necessary to re-calibrate the indicator as follows:

Shift switch lever to right position to turn the Rotor. When the end of rotation is reached, the needle must be on the right North position. To adjust, rotate the rheostat either in a clockwise or counter-clockwise direction until the above condition is obtained.

NOTE: This adjustment is best made as the needle approaches the right North position. Upon the end of rotation, the motor current will increase to a locked Rotor value which may lead to incorrect calibration at other compass points.

The adjustment is optimum when the needle is at a position at the center of the "N" an instant before Rotor reaches its end of revolution.

SERVICING THE CDR TR-4 ROTOR

GENERAL

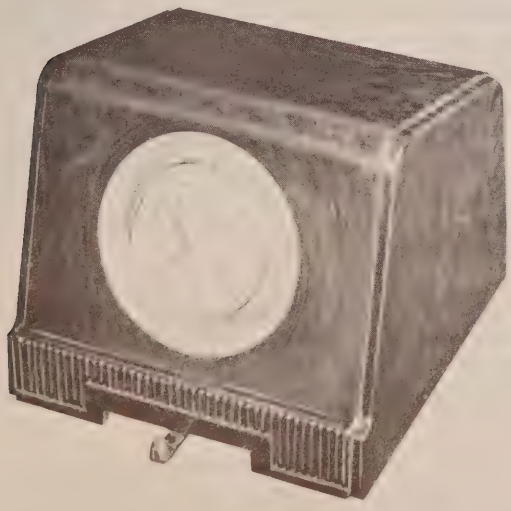
To service the Rotor, first remove the cable from the terminal connections and then the Rotor from its mounting mast.

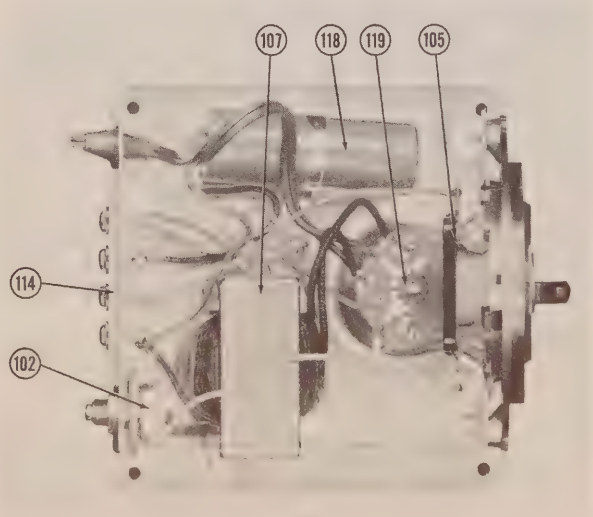
In the exploded view the individual parts of the Rotor with item numbers are shown. Use these item numbers to refer to parts list for the proper number.

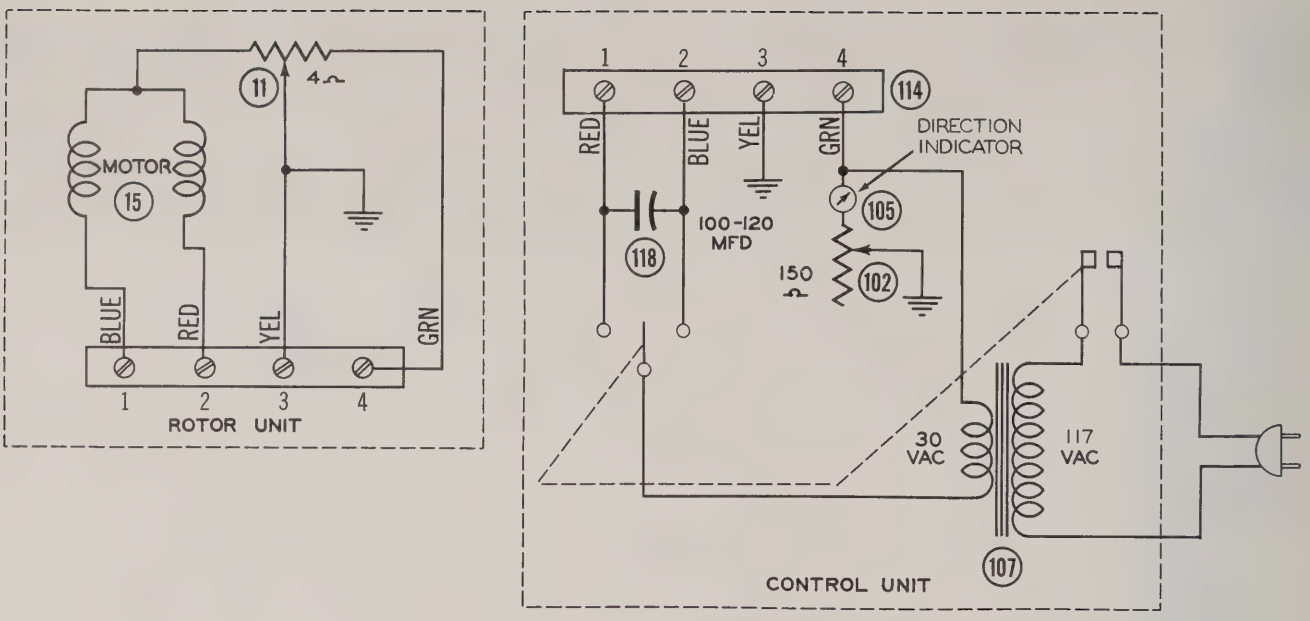
DISASSEMBLY

To disassemble the Rotor follow the steps given below:

1. The lower mast support casting is removed by removing the four hex head screws at the bottom of rotor.





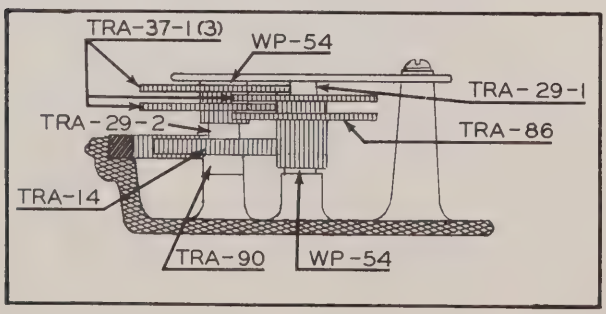


2. To remove the upper mast support or bell housing remove the four round head screws which hold the rotor base to the bell housing with a retaining ring. Hold the retaining ring to the bell housing and place the rotor in an upright position on any flat surface being used as a working area. The bell housing can now be removed without disturbing the retaining ring from its position on the rotor base.

3. Remove the bell housing carefully so as not to bend or distort the potentiometer contact which is located in the bell housing. The rotor parts are now accessible.

4. The entire electrical system of the rotor can be removed without unsoldering any connections. First remove the screws (SS-63-2) that hold the terminal strip (TRA-50) to the rotor base. (Check exploded view). Shift the terminal strip until it can be slipped through the hole in the rotor base. Remove the screw that holds the small terminal strip (IT-69) to the motor mounting plate. Remove the two hex nuts and shoulder washers from the mounting plate studs. The potentiometer can now be removed from the mounting plate studs. Next remove the insulator paper ring then remove the spacers and nuts, and slide the motor off the mounting studs. The completely wired electrical assembly is now free of the base plate.

5. The three screws that hold the motor mounting plate are removed and the plate can be lifted from its position. The gears and their spacers are now accessible and can be removed. The stop can be removed by removing the spring grip lockwasher that locks it in place.



NOTE: TRA-39 REPLACED THE SPUR GEAR TRA-14 IN LATER SERIES.

TO ASSEMBLE THE ROTOR

1. Using the gear train diagram replace the gears and their spacers. Then place the motor mounting plate in its position and replace only two screws, leaving out the screw that holds the ground terminal strip to the motor mounting plate.

2. Place the rotor base so that the terminal connecting strip hole at the bottom of the base is toward the repairman. The motor is then placed so that the slotted mounting hole of the motor is over the mounting stud that is to the left side of the repairman. The motor lead wires will be pointing toward the terminal connecting strip. Now adjust the motor pinion gear with the gear train. Move the motor back and forth along the slotted hole at the same time turn the gear train with the other hand until the best position of the motor is obtained. In the proper position the gear will run quietly without binding, then tighten the motor with the two nuts.

3. Replace the flat washers and the fiber spacer. The insulator paper ring is placed on the motor. Next position the potentiometer on the mounting studs. Place it so the lift cam which is the finger like projection of the potentiometer strip is away from the terminal strip hole of the rotor base. The shoulder washers are designed to keep the potentiometer from grounding against the studs. Place them through the potentiometer holes and tighten the potentiometer in place with the nuts.

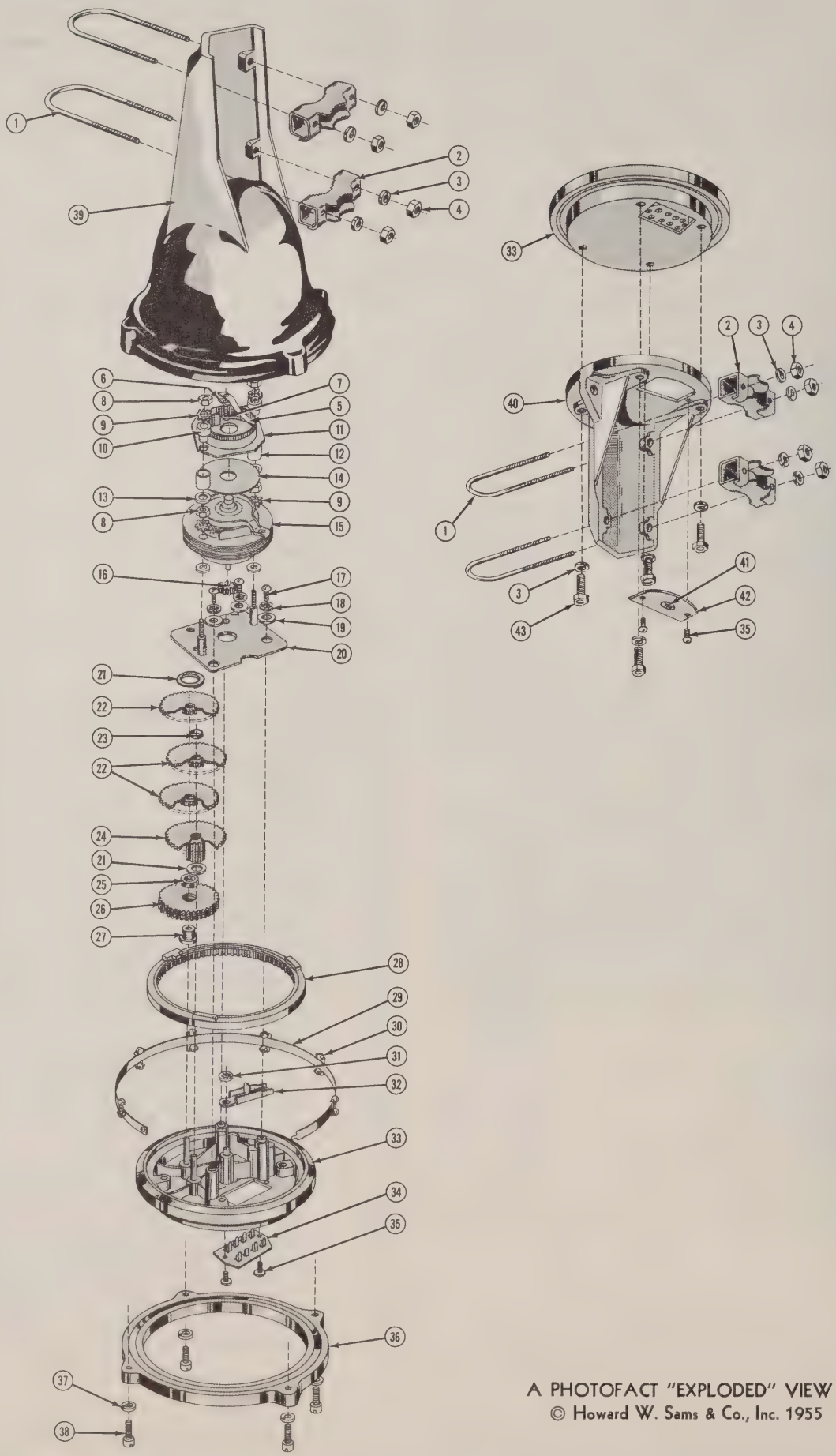
4. Now the small terminal ground strip can be put in place with the remaining motor mounting plate screw (SS-473-2). The terminal connecting strip is then slipped through the rotor base hole and held in place with the screws (SS-63-2).

5. IMPORTANT: To replace the bell housing run the rotor clockwise by hand to the end of rotation. By observing the stop on the driving gear the correct

position can be obtained. The rotor should be rotated clockwise until the stop boss on the driving gear is against the stop angle. The rotor base is placed in a position so that the terminal strip is away from the person repairing the unit and the lift cam of the potentiometer assembly is facing the repairman. The bell housing is lifted by the right hand with the contact inside the bell housing pointing toward the repairman. The bell housing is tilted away from the terminal strip of the rotor base and placed so that the contact will rest on the lift cam of the potentiometer assembly. Then the bell housing is shifted carefully until the slots fit into the lugs of the driving gear. Replace the four round head screws of the housing retainer ring which holds the bell housing to the rotor base and replace the lower mast support.

PARTS LIST

ITEM NO.	DESCRIPTION (No. in ( ) is Quantity Used)	PART No.
1	Bolt, "U" Type (4)	TRA-64
2	Clamp, Mast Mount (4)	TRA-59
3	Lockwasher, Split 1/4" (12)	WK-11-2
4	Nut, Hex 1/4-20 (8)	NM-50-2
5	Contactor (1)	TRA-73
6	Retainer Contactor (1)	TRA-72
7	Screw, Rd. Hd. Self Tap #8-32 x 3/8" Type F (1)	SS-684-2
8	Nut, Hex #8-32 x 11/32" (4)	NM-43-2
9	Lockwasher, Ext. #8 (4)	WL-12-2
10	Washer, Shoulder (2)	MX-62
11	Assembly, Potentiometer (4)	TRA-71
12	Spacer (2)	IS-25
13	Washer, Flat (2)	WP-11-2
14	Ring, Insulator (1)	MX-67
15A	Motor, Less Pinion (1)	TRA-80
B	Motor, Includes Pinion (1)	TRA-81
16	Pinion, Motor (1)	TRA-12
17	Screw, Rd. Hd. Thread Cutting #10-24 x 3/8 Type F (2)	SS-61-2
18	Lockwasher, Int. #10 (3)	WL-6-2
19	Washer, Flat 1/2" O.D. O.D. x .203" I.D. (3)	WP-14-2
20	Assembly, Mounting Plate and Stud (1)	TRA-75
21	Washer, Thrust (2)	WP-54
22	Assembly, Gear and Pinion (3)	TRA-37-1
23	Spacer (1)	TRA-29-1
24	Assembly, Gear and Pinion (1)	TRA-86
25A	Spacer (1), Early Series	TRA-29-1
B	Spacer (1)	TRA-84
26A	Gear, Spur (1) Early Series	TRA-14
B	Gear, Spur (1)	TRA-39
27A	Spacer, (1) Early Series	TRA-90
B	Spacer (1)	TRA-83
28	Gear, Driving (1)	TRA-18
29	Assembly, Strap and Bearing Retainer (1)	TRA-36
30	Bearing, Ball (12)	TRA-20-1
31	Lockwasher, Spring Grip (1)	WL-28
32	Assembly, Pivot, Arm and Shaft Angle (1)	TRA-23
33	Assembly, Base and Gear Shaft (1)	TRA-87
34	Terminal Strip (1)	TRA-50
35A	Screw, Rd. Hd. Self Tap #6-32 x 3/8", Type 23 (2)	SS-63-2
B	Screw, Rd. Hd. Self Tap #6-32 x 3/8", Type I (2)	SS-65-2
C	Screw, Rd. Hd. Self Tap #6-32 x 3/8", Type F (2)	SS-67-2
36	Ring, Retaining (1)	TRA-4
37	Lockwasher, Split #12 (4)	WK-6-2
38	Screw, Rd. Hd. Mach. #12-28 x 5/8" (4)	SM-206-2
39	Assembly, Upper Mast Support and Contactor (1)	TRA-79
40	Assembly, Lower Mast Support and Terminal Cover (1)	TRA-44
41	Rubber Grommet (1)	IG-5
42	Terminal Cover (1)	TRA-24
43	Screw, Hex Hd. Mach. 1/4-20 x 1" (4)	SM-120-2
101A	Meter Control Unit, Walnut (1)	MCU-32
101B	Meter Control Unit, Ivory (1)	MCU-32W
102	Rheostat (1)	MCU-2
103A	Handle, Walnut (1)	MCU-5-1
103B	Handle, Ivory (1)	MCU-5-2
104	Bezel (1)	MCU-7
105	Dial Plate and Meter (1)	MCU-8-1 MCU-8-2
106	Spring, Snap (4)	MCU-10
107	Transformer (1)	MCU-13
108	Insulator, Switch	MCU-17
109A	Cabinet, Walnut (1)	MX-22-1
109B	Cabinet, Ivory (1)	MX-22-2
110	Button, Trademark (1)	MX-31
111	Washer, Ext. Shoulder (1)	MX-38
112	Washer, Flat (1)	MX-39
113	Washer, Plain Fibre 1/2" OD x .205" ID x 1/16"	MX-51
114	Strip, 4 Pt Terminal (1)	RCP-5-2
115	Bumper, Recess (4)	RP-36
116	Screw, Rd. Hd. Self Tap Type 23 #6 x 3/8" (3)	SS-63-2
117	Screw, Rd. Hd. Th'd Cutting Type F #6-32 x 1/2" (4)	SS-71-2
118	Capacitor (1)	TRB-4
119	Switch, Wafer (1)	TRB-5-5 TRB-5-6
120A	Cord and Plug, Brown (1)	WM-19-1
120B	Cord and Plug, Ivory (1)	WM-19-1



A PHOTOFACT "EXPLODED" VIEW

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The PHOTOFACT Servicer

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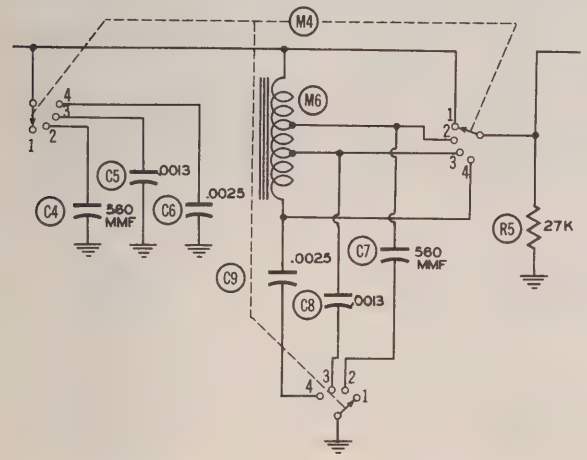
CORRECTION NOTES

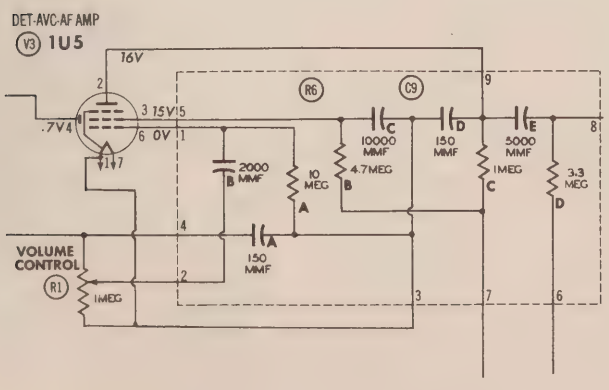
Fisher Model 50-F
PHOTOFACT Set 262 Folder 7

C7 and C9 were transposed on the schematic diagram. Correct connection is shown on the partial schematic below.



Capehart Model 1P55
PHOTOFACT Set 268 Folder 4

Terminal Number 3 and low end of volume control should connect to pin 1 of V3 instead of B- as shown. Revised section of schematic below indicates correction.



FACTORY SERVICE HINTS

The following service hints covering DuMont Television receivers are brought to you through the courtesy of DuMont Laboratories, Inc.

Models RA306, RA307
Photofact Set 241 Folder 6

Symptom: Picture does not have sufficient brightness. The Contrast control must be rotated fully clockwise for a visible picture. The Brightness control has very little effect on the picture.

Probable Fault: C93 (.1 MFD, 200 volt), the capacitor in the CRT retrace blanking circuit, is shorted.

Symptom: Critical horizontal and vertical hold. The Horizontal-Hold control locks in the picture over a narrow portion of its range. The picture cannot be locked in vertically.

Probable Fault: C82 (.1 MFD, 200 volt), the capacitor bypassing the screen of the 6BE6 sync separator, is shorted.

Symptom: Retrace lines in the picture.

Probable Fault: C93 (.1 MFD, 200 volts), the capacitor feeding the retrace blanking pulse to the CRT grid (pin 2), is open.

Symptom: Intermittent, flashing or momentary snowy pictures occur when the Channel Selector or Fine Tuning knobs are adjusted.

Probable Fault: Cold solder joint at pin 1 of V3, the 6J6 mixer oscillator stage.

Symptom: No vertical hold. As picture rolls, it momentarily loses vertical height and collapses to a bright horizontal line.

Probable Fault: C90 (.0022 MFD, 400 volt), the capacitor in the feed back circuit of the vertical multivibrator, is leaky.

Symptom: Keystone effect.

Probable Fault: C110 (75 MMF, 1600 volts), the yoke-damping capacitor, is shorted.

Symptom: Critical horizontal hold. The symptom is affected by the setting of the brightness control.

Probable Fault: C99 (.033 MFD, 200 volts), the capacitor connecting to pin 1 of the 6SN7 horizontal oscillator and ground, is leaky.

Symptom: Heavy picture noise in moderate or strong signal areas. This condition may occur continuously or intermittently.

Probable Fault: The RF amplifier or the 1st video IF tube is defective.

Symptom: Weak fringe signals are received with a normal amount of snow. Local stations are received with excessive picture noise.

Probable Fault: C44 (1 MFD, 200 volts), the AGC filter capacitor is shorted.

Symptom: Under extreme fringe operation optimum sound and picture do not coincide.

Probable Fault: The accompanying channel sound trap capacitor, A4, is not properly aligned.

Symptom: No raster due to loss of high voltage.

Probable Fault: C4 (4 MFD, 400 volts), the AGC amplifier cathode bypass capacitor, is open.

Symptom: No raster, no high voltage.

Probable Fault: C96 (.001 MFD, 700 volts), the coupling capacitor between the plate of V15A and the horizontal AFC, is leaky or shorted.

Remedy: Replace C96 and check R87 (680 ohm, 5%, 1/2 W) in the plate circuit of V15A. This resistor is usually damaged when the receiver is operating with C96 defective.

Symptom: Reduced vertical size (4 to 7 inches), with a bright line at the bottom of the picture.

Probable Fault: C87 (.047 MFD, 600 volts), the coupling capacitor in the vertical multivibrator, is leaky.

Symptom: Heavy foldover at the bottom of the picture.

Probable Fault: C88 (0.1 MFD, 600 volts), the coupling capacitor in the vertical multivibrator, is leaky.

Symptom: Loss of picture contrast. Black picture areas are grey.

Probable Fault: C49 (680 MMF, 500 volts), the ceramic bypass capacitor, located at the screen of the second video IF amplifier (pin 6 of V5), is leaky.

Symptom: Drive line in the center of the picture at high Brightness-Control settings.

Probable Fault: C4 (4 MFD, 400 volts), the filter capacitor for the + 145 volt source, is leaky.

Symptom: No vertical hold, or critical vertical hold.

Probable Fault: C85 (.0022 MFD, 400 volts), the capacitor coupling the vertical sync to the grid of the vertical oscillator (pin 7 of V15B), is leaky.

FACTORY SERVICE HINTS

The following service hint covering Arvin television receivers is brought to you through the courtesy of Arvin Industries, Inc., Columbus, Indiana.

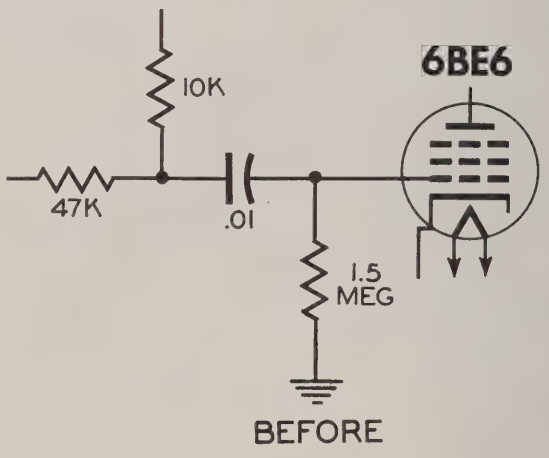
Chassis TE355, TE362
Photofact Set 248 Folder 2
Chassis TE358, -1, -2, -3
Photofact Set 238 Folder 4
Chassis TE359, TE364, -1
Photofact Set 235 Folder 2
Chassis TE373
Photofact Set 247 Folder 3

Subject: Poor horizontal sync stability due to improper signal.

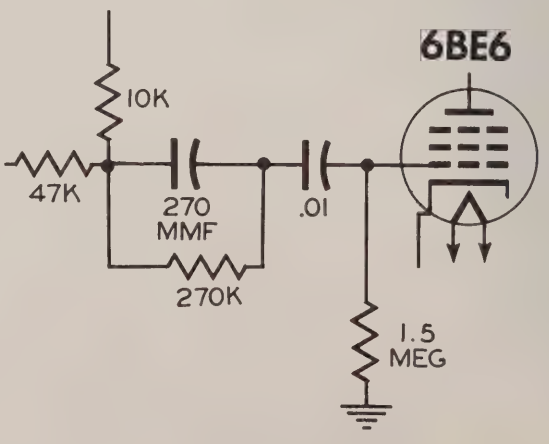
Description and Cause: Horizontal "wavering" in the top one-third of the picture may appear on receivers using the above chassis when the RF signals are received from faulty distribution systems. This "wavering" is due to intermittent partial loss of horizontal sync pulses in the receiver sync separator. These distribution systems that "pipe-in" RF signals are usually community antenna systems or multiple dwelling antenna systems.

Tests: Condition outlined above will not appear on a normal air signal.

Modification Details: Add parallel R-C (270 MMF and 270 K) circuit in line to sync separator. See schematic below.



BEFORE



AFTER CHANGE

The PHOTOFACT Servicer

Vol. 29, Nos. 285 & 286 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ May 15, 1955

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DENVER, COLORADO

REGISTRATION LISTS

of

RETMA PRODUCTION SOURCE CODE

January, 1955

Code symbols assigned to radio-television manufacturers and suppliers, arranged both alphabetically by companies and numerically by code numbers.

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777 14th Street, N. W., Washington 5, DC.

HOWARD W. SAMS & CO., INC.
Indianapolis 5, Indiana

ALPHABETICAL LIST

RETMA Production Source Code Symbols

January 1, 1955

(* Indicates non-members)

Company	Code No.
ACF Electronics, Division of ACF Industries, Inc., Alexandria, Va.	900
*Acme Coil & Transformer Corp., Chicago 14, Ill.	928
*Acme Electric Corporation, Cuba, N. Y.	413
Acro Products Company, Philadelphia 28, Penna.	878
Adler Communications Laboratories, New Rochelle, N. Y.	813
*Admiral Corporation, Chicago 47, Ill.	101
*Aerocoil, Inc., Jersey City, N. J.	908
*Aerolite Electronics Corp., Union City, N. J.	910
Aerovox Corporation, New Bedford, Mass.	102
*Aircraft-Marine Products, Inc., Harrisburg, Pa.	581
*Airdesign, Incorporated, Upper Darby, Pa.	476
*Ajax Condenser Co., Inc., Chicago 14, Ill.	705
*Aladdin Radio Industries, Inc., Nashville, Ten.	589
Alcon Metal Products, Inc., Chicago 47, Ill.	573
Allen-Bradley Company, Milwaukee 4, Wis.	106
The Alliance Manufacturing Co., Alliance, Ohio	107
Allied Research & Engineering, Inc., Hollywood 38, Calif.	905
All Star Products, Inc., Defiance, Ohio	110
Alpha Metals, Inc., Jersey City 4, N. J.	733
Altec Lansing Corporation, Beverly Hills, Calif.	391
American Condenser Company, Chicago 40, Ill.	109
*American Lava Corporation, Chattanooga 5, Tenn.	681
American Phenolic Corporation, Chicago 50, Ill.	554
*American Radio Hardware Co., Inc., Mt. Vernon, N. Y.	502
*American Radionic Co., Inc., Danbury, Conn.	648
*American Television, Inc., Chicago 5, Ill.	633
American Television & Radio Co., St. Paul 1, Minn.	551
*American Transformer Corp., Chicago 7, Ill.	892
*The American Woodworking Co., West Haven 16, Conn.	729
Amperex Electronic Corporation, Hicksville, L. I.. N. Y.	111
*Amy, Aceves & King, Inc., New York 36, N. Y.	112
*Anaconda Wire & Cable Company, Hastings-On-Hudson 6, N. Y.	547
*Anchor Electronics Inc., Union City, N. J.	707
*Andrea Radio Corporation, Long Island City 1, N. Y.	113
Andrew Corporation, Chicago 19, Ill.	402
Andrew's Tower, Inc., Fort Worth 11, Tex.	852
Arthur Ansley Manufacturing Co., Doylestown, Pa.	717
Antenna & Mounting Hardware Co., Franklin Park, Ill.	814
The Antenna Specialists Company, Cleveland 6, Ohio	820
A. R. F. Products, Inc., River Forest, Ill.	115
The Arnold Engineering Company, Sub. of Allegheny Ludlum Steel Corp., Marengo, Ill.	116
Arvin Industries, Inc., Columbus, Ind.	248
Atlantic Wire & Cable Company, College Point 56, N. Y.	792
*The Astatic Corporation, Conneaut, Ohio	545
Atlas Resistor Co., Philadelphia 44, Penna.	932
Audak Company, Inc., New York 18, N. Y.	517
*Audio Electric Company, Chicago 26, Ill.	514

Company	Code No.
Automatic Manufacturing Corp., Newark 4, N. J.	119
Automatic Radio Mfg. Co., Inc., Boston 15, Mass.	120
Avionex Electronics Corporation, Burbank, Calif.	860
Barker & Williamson, Inc., Upper Darby, Pa.	461
Barnes Metal Products Company, Chicago 23, Ill.	588
Basler Electric Company, Highland, Ill.	695
The Bead Chain Manufacturing Co., Bridgeport 5, Conn.	122
Belden Manufacturing Company, Chicago 44, Ill.	579
Bell Sound Systems, Inc., Columbus 7, Ohio	708
Bendix Radio, Division of Bendix Aviation Corp., Baltimore 4, Md.	125
*Best Manufacturing Co., Inc., Irvington 11, N. J.	371
*Better Coil & Transformer Corp., Goodland, Ind.	831
Bliley Electric Company, Erie, Pa.	128
David Bogen Co., Inc., New York 14, N. Y.	589
*Bradley Laboratories, Inc., New Haven 11, Conn.	812
British Industries Corporation, New York 13, N. Y.	409
Brubaker Manufacturing Company, Inc., Los Angeles 34, Calif.	817
Caledonia Electronics & Transformer Corp., Caledonia, N. Y.	503
*California Magnetic Control Corp., North Hollywood, Calif.	789
Cal-Tronics Corporation, Los Angeles 45, Calif.	862
Calvideo Tube Corporation, Los Angeles 45, Calif.	886
Cambrun, Inc., Woodside 77, N. Y.	430
C. F. Cannon Co., Springwater, N. Y.	133
Cannon Electric Company, Los Angeles 31, Calif.	440
Capehart-Farnsworth Company, Fort Wayne 1, Ind.	177
*Carbonneau Industries, Inc., Grand Rapids 4, Mich.	719
*The Allen D. Cardwell Mfg. Corp., Plainville, Conn.	827
Cargo Packers Inc., Brooklyn 11, N. Y.	901
*Carol Electronics Corporation, Martinsburg, W. Va.	837
*Carr Fastener Company, Division of United-Carr Fastener Corp., Cambridge 42, Mass.	370
*Carson Manufacturing Company, Indianapolis 18, Ind.	838
Carter Parts Company, Chicago 10, Ill.	610
C-B-C Electronics Co., Inc., Philadelphia 23, Pa.	867
CBS-Columbia, Division of Columbia Broadcasting System Inc., Long Island City 1, N. Y.	105
CBS-Hytron, Division of Columbia Broadcasting System Inc., Danvers, Mass.	210
Celco (Constantine Engineering Labs. Co.), Mahwah, N. J.	592
Centralab, Div. of Globe-Union Inc., Milwaukee 1, Wis.	134
*Central Coil Company, Inc., Indianapolis 22, Ind.	637
Central Sales & Manufacturing Co., Denville, N. J.	841
*Central Incorporated, Div. of Central Coil, Greensburg, Ind.	914
*Chester Cable Corp, Chester, N. Y.	909
Chicago Condenser Corporation, Chicago 47, Ill.	135
*Chicago Electronic Engineering Co., Chicago 47, Ill.	166
Chicago Standard Transformer Corp., Chicago 18, Ill.	138
Chicago Telephone Supply Corp., Elkhart, Ind.	137
Chromatic Television Laboratories, Inc., New York 36, N. Y.	850
Cinch Manufacturing Corporation, Chicago 24, Ill.	139
Clarostat Mfg. Co., Inc., Dover, N. H.	140
*Cleveland Electronics, Inc., Cleveland 3, Ohio	433
Clippard Instrument Laboratory, Inc., Cincinnati 31, Ohio	530
*Coilcraft, Incorporated, Cary, Ill.	906
*Coil Engineering & Mfg. Co., Inc., Roanoke, Ind.	141
Collins Radio Company, Cedar Rapids, Ia.	439
*Columbus Electronics Corporation, Yonkers, N. Y.	528
*Columbus Process Co., Inc., Columbus, Ind.	450
Communication Measurements Laboratory, Inc., Plainfield, N. J.	427
Condenser Manufacturers, Inc., Nashville 4, Tenn.	885
Connector Corporation, Chicago 30, Ill.	888
Conrac Incorporated, Glendora, Calif.	680
*Consolidated Radio Products Co., Chicago 10, Ill.	145
Consolidated Vultee Aircraft Corporation, Pomona, Calif.	898
Consolidated Wire & Associated Companies, Chicago 16, Ill.	607
Continental Carbon Inc., Cleveland 11, Ohio	146
Continental Electronics Corp., Philadelphia 31, Penna.	811
*Co-Operative Industries, Inc., Chester, N. J.	760
*Copperweld Steel Company, Glassport, Penna.	725
Corning Glass Works, Corning, N. Y.	148
Cornish Wire Company, Inc., New York 7, N. Y.	149
Cosmic Radio Corporation, New York 59, N. Y.	704
Crescent Industries, Inc., Chicago 31, Ill.	150
Crest Laboratories, Incorporated, Rockaway Beach 93, N. Y.	768
Croname, Incorporated, Chicago 13, Ill.	151
Crosley Radio and Television Division, Avco Manufacturing Corporation, Cincinnati 25, Ohio	152
*C.R.T. Electronics Corp., Mount Vernon, N. Y.	884
Crucible Steel Company of America, New York 17, N. Y.	525
Cubic Corporation, San Diego 6, Calif.	870

Company	Code No.
*Custom Parts Corporation, Mattituck, N. Y.	779
Dale Products, Inc., Columbus, Nebr.	816
J. W. Davis & Company, Dallas 9, Texas	563
*Davis Electric Company, Cape Girardeau, Mo.	628
Davis Electronics Co., Burbank, Calif.	865
*Dearborn Glass Company, Bedford Park, Ill.	385
DeJur-Amsco Corporation, Long Island City 1, N. Y.	780
Delco Radio Division, General Motors Corporation, Kokomo, Ind.	466
*Tobe Deutschmann Corporation, Norwood, Mass.	154
DeWald Radio Mfg. Corp., Long Island City 1, N. Y.	155
*Dinion Coil Co., Inc., Caledonia, N. Y.	895
D & M Products, Detroit 35, Mich.	903
Don Good Inc., South Pasadena, Calif.	861
*Dormitzer Electric & Mfg. Co., Inc., Cambridge 40, Mass.	493
R. L. Drake Company, Dayton 2, Ohio	851
Drake Manufacturing Company, Chicago 22, Ill.	586
Wilbur B. Driver Company, Newark 4, N. J.	156
DuKane Corporation, St. Charles. Ill.	252
*Dumont-Airplane & Marine Instruments, Inc., New York 5, N. Y.	157
Allen B. DuMont Laboratories, Inc., Clifton, N. J.	158
*DX Radio Products Company, Inc., Chicago 47, Ill.	159
Hugh H. Eby, Inc., Philadelphia 44, Pa.	160
Eckstein Radio & Television Co., Minneapolis 6, Minn.	161
Eitel-McCullough, Inc., San Bruno, Calif.	162
*Elco Corporation, Philadelphia 40, Pa.	599
Elcon Electronics Inc., Brooklyn 32, N. Y.	893
Eldico of New York, Inc., Mineola, Long Island, N. Y.	783
*Electrical Utilities Company, La Salle, Ill.	569
*Electrical Windings, Inc., Chicago 39, Ill.	682
*Electro-Mechanical Products Corporation, Riverhead, N. Y.	775
The Electro Motive Mfg. Co., Inc., Willimantic, Conn.	164
*Electronic Components Corporation, Chicago 8, Ill.	515
Electronic Devices, Inc., Brooklyn 15, N. Y.	752
Electronic Products Company, Mount Vernon, N. Y.	557
*Electronic Specialty Co., Los Angeles 39, Calif.	169
Electronic Tube Corporation, Philadelphia 18, Penna.	170
*Electrons, Incorporated, Newark 3, N. J.	935
Electro-Voice, Inc., Buchanan, Mich.	649
Elgin Metalformers Corporation, Elgin, Ill.	902
*El-Rad Manufacturing Co., Chicago 18, Ill.	632
Eltran Corporation, St. Anne, Ill.	603
Emerson Radio & Phonograph Corp., New York 11, N. Y.	171
*Empire Coil Company, Inc., New Rochelle, N. Y.	452
Ensign Coil Company, Chicago 23, Ill.	172
Erca Tool Die & Stamping Co., Brooklyn 22, N. Y.	762
Erie Resistor Corporation, Erie, Pa.	173
Espey Manufacturing Co., Inc., New York 21, N. Y.	174
*Esquire Radio Corporation, Brooklyn 19, N. Y.	742
*Essex Electronics, Berkeley Heights, N. J.	425
*Essex Wire Corporation, Fort Wayne 6, Ind.	175
Fada Radio and Electric Co., Inc., Belleville, N. J.	176
John E. Fast & Company, Chicago 41, Ill.	178
Federal Telephone and Radio Company, Clifton, N. J.	179
Fidelity Products Co., Inc., So. Orange, N. J.	494
Forbes & Wagner, Inc., Silver Creek, N. Y.	701
*The Forest Electric Company, Forest Park, Ill.	773
*The Formatic Company, Naugatuck, Conn.	735
*Foster Transformer Company, Cincinnati 23, Ohio	394
*Freed Electronics and Controls Corp., New York 13, N. Y.	183
Fretco Incorporated, Pittsburgh 13, Penna.	734
*L. H. Frost & Co., Inc., Grand Rapids 8, Mich.	746
*F. & V. Coil Winding Corporation, Newark 5, N. J.	572
*Gabriel Electronics Division, The Gabriel Company, Norwood, Mass.	397
*Gates Radio Company, Quincy, Ill.	187
*Gavitt Wire & Cable Co., Division of American Hard Rubber Co., Brookfield, Mass.	360
*General Cable Corporation, Perth Amboy, N. J.	571
General Cement Mfg. Co., Rockford, Ill.	396
*General Communication Company, Boston 15, Mass.	459
*General Dry Batteries, Inc., Cleveland 7, O.	807
General Electric Company, Syracuse 1, N. Y.	188
*General Electronics, Division of Arcturus Electronics Inc., Paterson 3, N. J.	189
The General Industries Company, Elyria, Ohio	190
General Instrument Corporation, Elizabeth 3, N. J.	191
General Magnetic Corporation, Detroit 34, Mich.	193
General Mills, Inc., Mechanical Division, Minneapolis 13, Minn.	927
General Precision Laboratory, Inc., Pleasantville, N. Y.	582
General Products Corporation, Union Springs, N. Y.	913

Company	Code No.
General Radio Company, Cambridge 39, Mass.	194
General Railway Signal Company, Rochester 2, N. Y.	644
*General Transformer Company, Homewood, Ill.	412
Germanium Products Corporation, Sub. of Radio Development & Research Corp., Jersey City 4, N. J.	924
G & H Wood Products Company, Brooklyn 11, N. Y.	795
Glaser-Steers Corporation, Belleville 9, N. J.	670
*Glass Products Company, Chicago 37, Ill.	475
The Fred Goat Co., Inc., Brooklyn 17, N. Y.	197
Good-All Electric Mfg. Co., Ogalalla, Nebr.	446
Gramer-Halldorson Transformer Corp., Chicago 39, Ill.	596
*Grand Transformers, Inc. Grand Haven, Mich.	757
Grigsby-Allison Company, Inc., Arlington Heights, Ill.	467
The Gudeman Company, Chicago 10, Ill.	438
Edwin I. Guthman & Co., Inc., Chicago 7, Ill.	198
The Hallicrafters Co., Chicago 24, Ill.	199
*Hamilton-Hall Mfg. Company, Milwaukee 2, Wis.	936
Hammarlund Mfg. Co., Inc., New York 1, N. Y.	201
Hardwick, Hindle, Inc., Newark 5, N. J.	411
Harman-Kardon, Inc., Westbury, Long Island, N. Y.	794
Harnett Electric Corporation, Port Washington, N. Y.	481
Hawley Products Company, St. Charles, Ill.	204
Haydu Brothers, Plainfield, N. J.	205
Hazeltine Electronics Corporation, Little Neck, Long Island, N. Y.	376
Hedco Manufacturing Corporation, Chicago 10, Ill.	535
*Henald Manufacturing Co., Piper City, Ill.	808
*Heppner Manufacturing Company, Round Lake, Ill.	575
The Hickok Electrical Instrument Co., Cleveland 8, O.	508
*Hillburn Electronic Products Co., Brooklyn 22, N. Y.	687
*Hinners-Galanek Radio Corporation, Long Island City 6, N. Y.	786
Hi-Q Division Aerovox Corporation, Olean, N. Y.	163
Hoffman Radio Corporation, Los Angeles 7, Calif.	207
John R. Hollingsworth Corporation, Clifton Heights, Pa.	659
*Holyoke Wire and Cable Corporation, Holyoke, Mass.	872
Hopkins Engineering Company, Altadena 3, Calif.	791
Hughes Aircraft Company, Culver City, Calif.	744
Hydro-Aire, Inc., Sub. of Crane Co., Burbank, Calif.	877
Hy-Gain Television Products, Lincoln, Nebr.	894
Illinois Condenser Co., Chicago 22, Ill.	616
The Indiana Steel Products Company, Chicago 2, Ill.	211
Industrial Development Engineering Associates, Inc., Indianapolis 26, Ind.	638
*Industrial Hardware Manufacturing Co., Inc., New York 12, N. Y.	866
Industrial Television, Inc., Clifton, N. J.	541
International Electronics Industries, Inc., Nashville, Tenn.	911
International Instruments, Inc., New Haven 15, Conn.	855
International Rectifier Corporation, El Segundo, Calif.	845
International Resistance Company, Philadelphia 8, Pa.	214
International Telemeter Corp., Los Angeles 25, Calif.	887
*Irvington Varnish & Insulator Co., Irvington 11, N. J.	215
*I-T-E Circuit Breaker Company, Philadelphia 30, Penna.	912
Jackson Electrical Instrument Co., Dayton 2, Ohio	216
*James Vibrapowr Company, Chicago 18, Ill.	863
J-B-T Instruments, Inc., New Haven 8, Conn.	442
Jeffers Electronics Division, Speer Carbon Company, Dubois, Penna.	724
Jefferson Electric Company, Bellwood, Ill.	218
Jefferson-Travis Incorporated, Sub. Emerson Radio & Phonograph Corp., Brooklyn, N. Y.	219
Jensen Manufacturing Company, Div. of The Muter Company, Chicago 38, Ill.	220
Jerrold Electronics Corporation, Philadelphia 46, Penna.	923
Jersey Specialty Co., Inc., Mountainview, N. J.	730
J. F. D. Manufacturing Co., Inc., Brooklyn 4, N. Y.	221
E. F. Johnson Company, Waseca, Minn.	222
Johnson Electronics Inc., Orlando, Fla.	784
Johnson & Hoffman Manufacturing Co., Mineola, N. Y.	639
Kay Electric Company, Pine Brook, N. J.	620
Kay Lab, San Diego 10, Calif.	925
Kay-Townes Antenna Company, Rome, Ga.	875
Kerrigan Lewis Manufacturing Co., Chicago 51, Ill.	223
Kester Solder Company, Chicago 39, Ill.	224
Keystone Electronics Company, Stamford, Conn.	699
Kimble Glass Company, Sub. of Owens-Illinois Glass Co., Toledo 1, Ohio	647
King Laboratories, Inc., Syracuse 3, N. Y.	225
Kip Electronics Corporation, Stamford, Conn.	593
Kline Iron and Metal Company, Columbia, S. C.	869
Klipsch & Associates, Hope, Ark.	843
*The James Knights Company, Sandwich, Ill.	504
*Kobzy Tool Company, Chicago 22, Ill.	594
Lenz Electric Manufacturing Co., Chicago 47, Ill.	228
*Leonard Electric Products Co., Inc., Brooklyn 32, N. Y.	570
Lewis and Kaufman, Ltd., Los Gatos, Calif.	738
Littelfuse, Incorporated, Des Plaines, Ill.	230
Litton Industries, Beverly Hills, Calif.	879
Lowell Manufacturing Company, St. Louis 17, Mo.	657
Machlett Laboratories, Incorporated, Springdale, Conn.	231
Macon Electronics, Div. York Radio & Television Corp., Warrenburg, Ill.	774
Madisco, Inc., Philadelphia 40, Penna.	743
The Magnavox Company, Fort Wayne 4, Ind.	232
Magnetic Coil Manufacturing Company, Chicago 22, Ill.	933
Magnetic Windings Division (Essex Wire Corporation), Easton, Pa.	352
P. R. Mallory & Co., Inc., Indianapolis 6, Ind.	235
Mark Electronics Inc., Newark 2, N. J.	806
H. S. Martin & Company, Evanston, Ill.	586
McCoy Electronics Co., Mt. Holly Springs, Penna.	832
McGregor Electronic Industries, Inc., McGregor, Ia.	789
McIntosh Laboratory, Inc., Binghamton, N. Y.	793
Measurements Corporation, Boonton, N. J.	236
Mel-Rain Corporation, Indianapolis 4, Ind.	834
Merit Coil & Transformer Corp., Chicago 40, Ill.	239
Methode Manufacturing Corp., Chicago 47, Ill.	720
Micamold Radio Corporation, Brooklyn 37, N. Y.	240
Microwave Associates, Inc., Boston 15, Mass.	803
Midland Manufacturing Co., Inc., Kansas City 15, Kan.	828
Mid-West Coil & Transformer Co., Chicago 14, Ill.	549
James Millen Manufacturing Co., Inc., Malden 48, Mass.	242
Milwaukee Resistor Company, Milwaukee 4, Wis.	722
Mississippi Products, Inc., Jackson, Miss.	445
Mohawk Electronics Corp., Chicago 10, Ill.	883
Mosley Electronics, Incorporated, St. Louis 14, Mo.	750
Motorola Inc., Chicago 51, Ill.	185
Multi-Tron Laboratory, Chicago 44, Ill.	693
Muntz TV, Inc., Chicago 13, Ill.	772
The Muter Company, Chicago 5, Ill.	244
Mycalex Corporation of America, Clifton, N. J.	642
National Aeronautical Corporation, Ambler, Pa.	643
National Company, Inc., Malden 48, Mass.	245
National Electric Products Corp., Pittsburgh 22, Penna.	769
National Electronics, Inc., Geneva, Ill.	749
National Fabricated Products, Inc., Chicago 47, Ill.	246
National Moldite Company, Hillside 5, N. J.	367
National Video Corporation, Chicago 32, Ill.	836
*Newcomb Audio Products Company, Hollywood 38, Calif.	437
New York Transformer Co., Inc., Alpha, N. J.	366
North American Philips Company, Inc., New York 17, N. Y.	423
Oak Electronics Company, Buffalo 3, N. Y.	739
Oak Mfg. Co., Chicago 10, Ill.	249
*Oaktron Electric Company, Tinley Park, Ill.	934
*Oaktron Industries Inc., Monroe, Wis.	918
*Ogden Coil & Transformer Co., Chicago 12, Ill.	776
The Ohio Carbon Company, Cleveland 11, Ohio	250
Ohmite Manufacturing Company, Skokie, Ill.	251
Olympic Metal Products Co., Inc., Alpha 1, N. J.	740
Olympic Radio & Television Inc., Long Island City 1, N. Y.	200
Onondaga Pottery Company, Syracuse 1, N. Y.	848
Orradio Industries, Inc., Opelika, Ala.	840
Otis Radio & Electric Corp., Hawarden, Iowa	552
Oxford Electric Corporation, Chicago 15, Ill.	465
Packard-Bell Company, Los Angeles 64, Calif.	254
Pan-Electronics Corporation, Atlanta, Ga.	804
Parisian Novelty Company, Chicago 9, Ill.	257
Parker Metal Goods Company, Worcester 8, Mass.	929
*Paul & Beekman, Inc., Philadelphia 40, Pa.	736
Penn Television Products Company, Philadelphia 34, Pa.	726
Penn Tran Corporation, Bellefonte, Pa.	665
Penta Laboratories, Inc., Santa Barbara, Calif.	771
*Perfection Electric Company, Chicago 16, Ill.	592
Permoflux Corporation, Chicago 39, Ill.	258
*Permoflux Corporation, Glendale 4, Calif.	395
Permo, Incorporated, Chicago 26, Ill.	259
*Phalo Plastics Corporation, Worcester 8, Mass.	697
Phen-O-Tron, Inc., New Rochelle, N. Y.	878
Philco Corporation, Philadelphia 34, Pa.	260
Philmore Manufacturing Co., Inc., New York 3, N. Y.	262
Pickering and Company, Inc., Oceanside, N. Y.	631
Pilot Radio Corporation, Long Island City 1, N. Y.	264
Pioneer Electronics Corporation, Santa Monica, Calif.	706
Plamondon Magnetics Company, Chicago 22, Ill.	882
*Planet Manufacturing Corporation, Bloomfield, N. J.	761

Company	Code No.
*Plastoid Corporation, Hamburg, N. J.	435
*Polan Industries, Inc., Huntington 19, W. Va.	937
Polarad Electronics Corporation, Brooklyn 11, N. Y.	562
*Polyphase Engineering, Chicago 22, Ill.	889
Precision Apparatus Company, Inc., Glendale 27, Long Island, N. Y.	505
Precision Electronics Inc., Franklin Park, Ill.	871
Premax Products Division, Chisholm-Ryder Co., Inc., Niagara Falls, N. Y.	267
*R. Prescott & Son, Inc., Keeseville, N. Y.	356
Prodelin, Inc., Kearny, N. J.	703
*Pyramid Electric Company, North Bergen, N. J.	472
*Pyroferric Company, New York 67, N. Y.	538
*Q. L. C. Corporation, Summit, N. J.	464
Quam-Nichols Company, Chicago 37, Ill.	270
Quincy Speaker Manufacturing Corp., Quincy, Ill.	767
Rada Products Co., Chicago 12, Illinois	482
Radell Corporation, Indianapolis 26, Ind.	829
Radio Apparatus Corporation, Indianapolis 26, Ind.	702
Radio Condenser Company, Camden 3, N. J.	273
Radio Corporation of America, Camden, N. J.	274
The Radio Craftsmen, Inc., Chicago 40, Ill.	275
Radio Engineering Laboratories, Inc., Long Island City 1, N. Y.	276
*Radio Industries, Inc., Chicago 40, Ill.	540
Radio Materials Corporation, Chicago 18, Ill.	732
*The Radion Corporation, Chicago 14, Ill.	700
*Radio Receptor Company, Inc., New York 11, N. Y.	380
Radio Specialty Manufacturing Co., Portland 14, Oregon	587
*Radio Television Products Corp., Grass Lake, Mich.	489
RAM Electronics, Inc., Irvington-on-Hudson, N. Y.	617
*Ratel, Inc., Monrovia, Calif.	835
Raytheon Manufacturing Company, Waltham 54, Mass.	280
Raytronic Laboratories, Inc., Cincinnati 15, Ohio	930
Rea Magnet Wire Company, Inc., Fort Wayne 4, Ind.	281
Rectifier Corporation of Puerto Rico, Fajardo, P. R.	844
*Red Lion Cabinet Company, Red Lion, Pa.	384
Rek-O-Kut Company, Long Island City 1, N. Y.	282
Remington Rand Inc., South Norwalk, Conn.	283
Remler Company, Ltd., San Francisco 10, Calif.	284
Resitron Laboratories, Inc., Santa Monica, Calif.	917
Rhode Island Insulated Wire Co., Inc., Cranston, R. I.	678
Richardson Company, Hollywood 28, Calif.	919
*Richmond Radionics Corp., Delavan, Wis.	796
*Rodefer Glass Company, Bellaire, Ohio	709
*Rogers Electronic Corp., New York 12, N. Y.	677
The Rola Company, Inc., Div. of The Muter Company, Cleveland 14, Ohio	285
*Rollan Electric Co., Chicago 19, Ill.	721
*Rollins Corporation, Lewes, Del.	915
The Ross Manufacturing Company, Chicago 40, Ill.	286
*Russell Speaker Company, Chicago 29, Ill.	748
S & A Electronics, Toledo 5, Ohio	872
*Sampson Electric Products Co., Clinton, N. C.	518
San Fernando Electric Mfg. Co., San Fernando, Calif.	815
Sangamo Electric Company, Marion, Ill.	658
*Santay Corporation, Chicago 24, Ill.	368
*Sarkes Tarzian, Inc., Bloomington, Ind.	684
Schneider & Marquard, Inc., Brooklyn 17, N. Y.	520
Walter L. Schott Company, Los Angeles 18, Calif.	287
*Schulmerich Electronics, Inc., Sellersville, Penna.	428
J. P. Seeburg Corporation, Chicago 22, Ill.	289
*Senn Corporation, New Augusta, Ind.	907
Sentinel Radio Corporation, Evanston, Ill.	291
Sheffco Mfg. Corp., Palisades Park, N. J.	698
*Sheldon Electric Company, Div. of Allied Electric Products, Inc., Irvington 11, N. J.	636
Shoup Engineering Company, Chicago 4, Ill.	674
Shure Brothers, Incorporated, Chicago 10, Ill.	590
Shurite Meters (J-B-T Instruments, Inc.), New Haven 8, Conn.	484
F. W. Sickles Division, Sub. of General Instrument Corp., Chicopee, Mass.	294
Simpson Electric Company, Chicago 44, Ill.	614
*Mark Simpson Manufacturing Co., Inc., Long Island City 3, N. Y.	295
Skiatron Electronics & Television Corp., New York 3, N. Y.	931
*Solar Manufacturing Corporation, Los Angeles 58, Calif.	296
*Sonora Radio & Television Corp., Chicago 12, Ill.	297
*Sonotone Corporation, Elmsford, N. Y.	787
*Soreng Products Corporation, Schiller Park, Ill.	711
Southern Electronics Company, Greeneville, Tenn.	891
*Sparton Radio-Television Division, The Sparks Withington Company, Jackson, Mich.	299
Special Products Company, Rockville, Md.	474
Speer Resistor Division, Speer Carbon Company, St. Marys, Penna.	300
Spencer Kennedy Laboratories, Inc., Cambridge 39, Mass.	782
*Sperti Faraday Inc., Cincinnati 2, Ohio	302
Sprague Electric Company, North Adams, Mass.	303
Sprague Electric Company of Wisconsin, Inc., Grafton, Wis.	457
Stackpole Carbon Company, St. Marys 3, Pa.	304
*Standard Coil Products Co. Inc., Melrose Park, Ill.	305
*Standard Condenser Company, Chicago 13, Ill.	710
*Standard Electrical Products Co., Dayton 3, Ohio	668
Standard Electronics Corporation, Newark 5, N. J.	694
Standard Piezo Company, Carlisle, Pa.	501
*Standard Winding Company, Newburgh, N. Y.	550
*Stanwyck Winding Company, Newburgh, N. Y.	574
*Star Products Company, Chicago 16, Ill.	613
The Staver Company Incorporated, Bay Shore, L. I.	604
Stevens Wire Insulating Company, Chicago 30, Ill.	597
Stewart-Warner Electric, Div. of Stewart-Warner Corporation, Chicago 51, Ill.	307
*Stoddart Aircraft Radio Co., Hollywood 38, Calif.	369
Stone City Machine & Tool Co., Inc., Bedford, Ind.	770
Stromberg-Carlson Company, Rochester 3, N. Y.	308
*Stupakoff Ceramic & Mfg. Co., Latrobe, Penna.	309
Superior Tube Company, Norristown, Pa.	310
Supreme, Incorporated, Greenwood, Miss.	311
Surprenant Mfg. Co., Boston 8, Mass.	624
Sylvania Electric Products Inc., New York 19, N. Y. (Sylvania)	312
(Colonial)	142
Symphonic Radio and Electronic Corp., Boston 14, Mass.	351
*Syntronic Instruments, Inc., Addison, Ill.	822
Talk-A-Phone Co., Chicago 23, Ill.	132
Taylor Tubes, Inc., Chicago 47, Ill.	713
*Tech-Master Corporation, New York 13, N. Y.	679
*Technical Appliance Corp., Sherburne, N. Y.	737
Technical Training Institute, Portland 11, Ore.	921
Telechrome Incorporated, Amityville, N. Y.	868
*Tele King Corporation, New York 1, N. Y.	583
*Telequip Radio Company, Chicago 8, Ill.	454
*Teleradio Engineering Corporation, Wilkes Barre, Pa.	357
Tel-Instrument Co., Inc., Carlstadt, N. J.	536
*Tel-O-Tube Corporation of America, East Paterson, N. J.	818
*TELvision Laboratories, Inc., Wauconda, Ill.	608
*Tempel Manufacturing Company, Chicago 26, Ill.	745
Tempo T-V Products Company, Los Angeles 47, Calif.	802
The Tetrad Company, Yonkers 2, N. Y.	842
*Thermador Electrical Mfg. Co., Los Angeles 22, Calif.	825
*Thomas & Skinner Steel Products Co., Indianapolis 7, Ind.	318
Thomas Associates, Los Angeles 38, Calif.	880
Thomas Electronics, Inc., Passaic, N. J.	672
*Thordarson-Meissner, Mt. Carmel, Ill.	238
T J Mfg. Corporation, Martinsville, Ind.	854
*Todd Electric Company, Inc., Yonkers, N. Y.	926
*Todd Products Co., Inc., Mt. Vernon, N. Y.	634
*Todd-Tran Corp., Mt. Vernon, N. Y.	635
*B. J. Toegel, Inc., Plainfield, N. J.	548
*Trad Television Corporation, Asbury Park, N. J.	688
Transistor Products, Inc., Waltham 54, Mass.	856
Translite Electronics Corp., Chicago 39, Ill.	810
Trans-Vue Corporation, Chicago 16, Ill.	217
Trav-Ler Radio Corporation, Chicago 6, Ill.	320
Tresco (Transformer and Electronics Specialties Company), Philadelphia 28, Pa.	897
*Triad Transformer Corporation, Venice, Calif.	830
Triplett Electrical Instrument Co., Bluffton, Ohio	321
Tristao Manufacturing Company, Kansas City 6, Mo.	874
*Triwec-Transformer Company, Chicago 18, Ill.	524
Tung-Sol Electric Inc., Newark 4, N. J.	322
The Turner Company, Cedar Rapids, Iowa	696
*TV Products Division, Union Electric & Mfg. Co. Jersey City 7, N. J.	618
*The Ucinite Company, Newtonville 60, Mass.	381
U M & F Manufacturing Corp., North Hollywood, Calif.	859
*Union Electric & Manufacturing Co., Jersey City 7, N. J.	804
United Condenser Corporation, New York 56, N. Y.	516
United Electronics Company, Newark 4, N. J.	323
*United Electronic Manufacturing Corp., Union City, N. J.	820
*United States Radium Corporation, New York 7, N. Y.	324
*United Transformer Corporation, New York 13, N. Y.	418
Unitek Corporation, Pasadena 8, Calif.	881
Universal Company, High Point, N. C.	756

Company	Code No.
University Loudspeakers, Inc., White Plains, N. Y.	847
*Utah Radio Products Co., Inc., Huntington, Ind.	328
Vacuum Tube Products, Oceanside, Calif.	781
Valpey Crystal Corporation, Holliston, Mass.	527
Varian Associates, Palo Alto, Calif.	809
Vidaire Electronics Mfg. Co., Lynbrook, L. I., N. Y.	797
*Videocraft Manufacturing Co., Chicago 39, Ill.	824
Viking Electric, Los Angeles 17, Calif.	896
*V-M Corporation, Benton Harbor, Mich.	857
Vokar Corporation, Dexter, Mich.	168
John Volkert Metal Stampings, Inc., Queens Village 29, Long Island, N. Y.	507
*Waldom Electronics, Inc., Chicago 10, Ill.	555
Wm. T. Wallace Mfg. Co., Inc., Peru, Ind.	330
*Ward Leonard Electric Co., Mount Vernon, N. Y.	532
*Ward Products Corporation, Division of The Gabriel Company, Cleveland 15, Ohio	331
*Warwick Manufacturing Corporation, Chicago 44, Ill.	332
Waterman Products Company, Inc., Philadelphia 25, Pa.	431
Waters Conley Company, Rochester, Minn.	382
*Webster-Chicago Corporation, Chicago 39, Ill.	375
Weller Electric Corporation, Easton, Pa.	662
Wells-Gardner & Co., Chicago 39, Ill.	334
Wm. H. Welsh Co., Inc., Chicago 16, Ill.	335
*Wesco Electric Company, Inc., Chicago 31, Ill.	553
Western Electric Company, Inc., New York 5, N. Y.	336
Westinghouse Electric Corporation, Baltimore 3, Md.	337
Weston Electrical Instrument Corp., Newark 5, N. J.	338
*The Wheeler Insulated Wire Company, Inc., Waterbury 20, Conn.	392
Wheeler Laboratories, Inc., Great Neck, N. Y.	529
The Whitney Blake Company, New Haven 14, Conn.	741
*Wilcox Electric Company, Inc., Kansas City 27, Mo.	339
Wind Turbine Company, West Chester, Pa.	653
Winsted Division, Hudson Wire Company, Winsted, Conn.	666
Wire Company of America, Santa Barbara, Calif.	890
*Wirt Company, Philadelphia 44, Penna.	406
W. M. C. Inc., Chicago 47, Ill.	584
*Woodward-Schumacher Electric Corp., Chicago 22, Ill.	606
*Worthco Corporation, Beverly Hills, Calif.	785
Wright Zimmerman, Inc., New Brighton, Minn.	683
The Yale & Towne Manufacturing Co., Powdered Metal Products Division, Franklin Park, Ill.	539
*The Zell Products Corp., Norwalk, Conn.	342
Zenith Radio Corporation, Chicago 39, Ill.	343
Z & W Machine Products Inc., Cleveland 3, O.	819

NUMERICAL LIST

RETMA Production Source Code Symbols

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(* Indicates non-members)

Code No.	Company
101	*Admiral Corporation, Chicago 47, Ill.
102	Aerovox Corporation, New Bedford, Mass.
105	CBS-Columbia, Division of Columbia Broadcasting System, Inc., Long Island City 1, N. Y.
106	Allen-Bradley Company, Milwaukee 4, Wis.
107	The Alliance Manufacturing Co., Alliance, Ohio
109	American Condenser Company, Chicago 40, Ill.
110	All Star Products, Inc., Defiance, Ohio
111	Amperex Electronic Corporation, Hicksville, L. I., N. Y.
112	*Amy, Aceves & King, Inc., New York 36, N. Y.
113	*Andrea Radio Corporation, Long Island City 1, N. Y.
115	A. R. F. Products, Inc., River Forest, Ill.
116	The Arnold Engineering Company, Sub. of Allegheny Ludlum Steel Corp., Marengo, Ill.
119	Automatic Manufacturing Corp., Newark 4, N. J.
120	Automatic Radio Mfg. Co., Inc., Boston 15, Mass.
122	The Bead Chain Manufacturing Co., Bridgeport 5, Conn.
125	Bendix Radio, Division of Bendix Aviation Corporation, Baltimore 4, Md.
128	Bliley Electric Company, Erie, Pa.
132	Talk-A-Phone Co., Chicago 23. Ill.
133	C. F. Cannon Co., Springwater, N. Y.
134	Centralab, Div. of Globe-Union Inc., Milwaukee 1, Wis.
135	Chicago Condenser Corporation, Chicago 47, Ill.
137	Chicago Telephone Supply Corp., Elkhart, Ind.
138	Chicago Standard Transformer Corp., Chicago 18, Ill.
139	Cinch Manufacturing Corporation, Chicago 24, Ill.
140	Clarostat Mfg. Co., Inc., Dover, New Hampshire
141	*Coil Engineering & Mfg. Co., Inc., Roanoke, Ind.
142	Sylvania Electric Products Inc., New York 19, N. Y. (Colonial)
145	*Consolidated Radio Products Co., Chicago 10, Ill.
146	Continental Carbon Inc., Cleveland 11, Ohio
148	Corning Glass Works, Corning, N. Y.
149	Cornish Wire Company, Inc., New York 7, N. Y.
150	Crescent Industries, Inc., Chicago 31, Ill.
151	Croname, Incorporated, Chicago 13, Ill.
152	Crosley Radio and Television Division, Avco Manufacturing Corporation, Cincinnati 25, Ohio
154	*Tobe Deutschmann Corporation, Norwood, Mass.
155	DeWald Radio Mfg. Corp., Long Island City 1, N. Y.
156	Wilbur B. Driver Company, Newark 4, N. J.
157	*Dumont-Airplane & Marine Instruments, Inc., New York 5, N. Y.
158	Allen B. DuMont Laboratories, Inc., Clifton, N. J.
159	*DX Radio Products Company, Inc., Chicago 47, Ill.
160	Hugh H. Eby, Inc., Philadelphia 44, Pa.
161	Eckstein Radio & Television Co., Minneapolis 6, Minn.
162	Eitel-McCullough, Inc., San Bruno, Calif.
163	Hi-Q Division Aerovox Corporation, Olean, N. Y.
164	The Electro Motive Mfg. Co., Inc., Willimantic, Conn.
166	*Chicago Electronic Engineering Co., Chicago 47, Ill.
168	Vokar Corporation, Dexter, Michigan
169	*Electronic Specialty Co., Los Angeles 39, Calif.
170	Electronic Tube Corporation, Philadelphia 18, Pa.
171	Emerson Radio & Phonograph Corp., New York 11, N. Y.
172	Ensign Coil Company, Chicago 23, Ill.
173	Erie Resistor Corporation, Erie, Pa.
174	Espey Manufacturing Company, Inc., New York 21, N. Y.
175	*Essex Wire Corporation, Fort Wayne 6, Ind.
176	Fada Radio and Electric Co., Inc., Belleville, N. J.
177	Capehart-Farnsworth Company, Fort Wayne 1, Ind.
178	John E. Fast & Company, Chicago 41, Ill.
179	Federal Telephone and Radio Company, Clifton, N. J.
183	*Freed Electronics and Controls Corp., New York 13, N. Y.
185	Motorola Inc., Chicago 51, Ill.
187	*Gates Radio Company, Quincy, Ill.
188	General Electric Company, Syracuse 1, N. Y.
189	*General Electronics, Division of Arcturus Electronics Inc., Paterson 3, N. J.
190	The General Industries Company, Elyria, Ohio
191	General Instrument Corporation, Elizabeth 3, N. J.
193	General Magnetic Corporation, Detroit 34, Mich.
194	General Radio Company, Cambridge 39, Mass.
197	The Fred Goat Co., Inc., Brooklyn 17, N. Y.
198	Edwin I. Guthman & Company, Inc., Chicago 7, Ill.
199	The Hallicrafters Company, Chicago 24, Ill.
200	Olympic Radio & Television Inc., Long Island City 1, N. Y.
201	Hammarlund Mfg. Co., Inc., New York 1, N. Y.
204	Hawley Products Company, St. Charles, Ill.
205	Haydu Brothers, Plainfield, N. J.
207	Hoffman Radio Corporation, Los Angeles 7, Calif.
210	CBS-Hytron, Division of Columbia Broadcasting System, Inc., Danvers, Mass.
211	The Indiana Steel Products Company, Chicago 2, Ill.
214	International Resistance Company, Philadelphia 8, Pa.
215	*Irvington Varnish & Insulator Co., Irvington 11, N. J.
216	Jackson Electrical Instrument Co., Dayton 2, Ohio
217	Trans-Vue Corporation, Chicago 16, Ill.
218	Jefferson Electric Company, Bellwood, Ill.
219	Jefferson-Travis Incorporated, Sub. Emerson Radio & Phonograph Corp., Brooklyn, N. Y.
220	Jensen Manufacturing Company, Div. of The Muter Company, Chicago 38, Ill.
221	J. F. D. Manufacturing Co., Inc., Brooklyn 4, N. Y.
222	E. F. Johnson Company, Waseca, Minn.
223	Kerrigan Lewis Manufacturing Co., Chicago 51, Ill.
224	Kester Solder Company, Chicago 39, Ill.
225	King Laboratories, Inc., Syracuse 3, N. Y.
228	Lenz Electric Manufacturing Co., Chicago 47, Ill.

Code No.	Company
230	Littelfuse, Incorporated, Des Plaines, Ill.
231	Machlett Laboratories, Incorporated, Springdale, Conn.
232	The Magnavox Company, Fort Wayne 4, Ind.
235	P. R. Mallory & Co., Inc., Indianapolis 6, Ind.
236	Measurements Corporation, Boonton, N. J.
238	*Thordarson-Meissner, Mt. Carmel, Ill.
239	*Merit Coil & Transformer Corp., Chicago 40, Ill.
240	Micamold Radio Corporation, Brooklyn 37, N. Y.
242	James Millen Manufacturing Co., Inc., Malden 48, Mass.
244	The Muter Company, Chicago 5, Ill.
245	*National Company, Inc., Malden 48, Mass
246	National Fabricated Products, Inc., Chicago 47, Ill.
248	Arvin Industries, Inc., Columbus, Ind.
249	Oak Mfg. Co., Chicago 10, Ill.
250	The Ohio Carbon Company, Cleveland 11, Ohio
251	Ohmite Manufacturing Company, Skokie, Ill.
252	DuKane Corporation, St. Charles, Ill.
254	Packard-Bell Company, Los Angeles 64, Calif.
257	Parisian Novelty Company, Chicago 9, Ill.
258	Permoflux Corporation, Chicago 39, Ill.
259	Permo, Incorporated, Chicago 26, Ill.
260	Philco Corporation, Philadelphia 34, Pa.
262	Philmore Manufacturing Co., Inc., New York 3, N. Y.
264	Pilot Radio Corporation, Long Island City 1, N. Y.
267	Premax Products Division, Chisholm-Ryder Co., Inc., Niagara Falls, N. Y.
270	Quam-Nichols Company, Chicago 37, Ill.
273	Radio Condenser Company, Camden 3, N. J.
274	Radio Corporation of America, Camden, N. J.
275	The Radio Craftsmen, Inc., Chicago 40, Ill.
276	Radio Engineering Laboratories, Inc., Long Island City 1, N. Y.
280	Raytheon Manufacturing Company, Waltham 54, Mass.
281	Rea Magnet Wire Company, Inc., Fort Wayne 4, Ind.
282	Rek-O-Kut Company, Long Island City 1, N. Y.
283	Remington Rand Inc., South Norwalk, Conn.
284	Remler Company, Ltd., San Francisco 10, Calif.
285	The Rola Company, Inc., Div. of The Muter Company, Cleveland 14, Ohio
286	The Ross Manufacturing Company, Chicago 40, Ill.
287	Walter L. Schott Company, Los Angeles 18, Calif.
289	J. P. Seeburg Corporation, Chicago 22, Ill.
291	Sentinel Radio Corporation, Evanston, Ill.
294	F. W. Sickles Division, Sub. of General Instrument Corp., Chicopee, Mass.
295	*Mark Simpson Manufacturing Co., Inc. Long Island City 3, N. Y.
296	*Solar Manufacturing Corporation, Los Angeles 58, Calif.
297	*Sonora Radio & Television Corp., Chicago 12, Ill.
299	*Sparton Radio-Television Division, The Sparks Withington Company, Jackson, Mich.
300	Speer Resistor Corporation, Saint Marys, Pa.
302	*Sperti Faraday Inc., Cincinnati 2, Ohio
303	Sprague Electric Company, North Adams, Mass.
304	Stackpole Carbon Company, St. Marys 3, Pa.
305	*Standard Coil Products Co. Inc., Melrose Park, Ill.
307	Stewart-Warner Electric, Div. of Stewart-Warner Corporation, Chicago 51, Ill.
308	Stromberg-Carlson Company, Rochester 3, N. Y.
309	*Stupakoff Ceramic & Mfg. Co., Latrobe, Penna.
310	Superior Tube Company, Norristown, Pa.
311	Supreme, Incorporated, Greenwood, Miss.
312	Sylvania Electric Products Inc., New York 19, N. Y.
318	*Thomas & Skinner Steel Products Co., Indianapolis 7, Ind.
320	Trav-Ler Radio Corporation, Chicago 6, Ill.
321	Triplett Electrical Instrument Co., Bluffton, Ohio
322	Tung-Sol Electric Inc., Newark 4, N. J.
323	United Electronics Company, Newark 4, N. J.
324	*United States Radium Corporation, New York 7, N. Y.
328	*Utah Radio Products Co., Inc., Huntington, Ind.
330	Wm. T. Wallace Mfg. Co., Inc., Peru, Ind.
331	*Ward Products Corporation, Division of The Gabriel Company, Cleveland 15, Ohio
332	*Warwick Manufacturing Corporation, Chicago 44, Ill.
334	Wells-Gardner & Co., Chicago 39, Ill.
335	Wm. H. Welsh Co., Inc., Chicago 16, Ill.
336	Western Electric Company, Inc., New York 5, N. Y.
337	Westinghouse Electric Corporation, Baltimore 3, Md.
338	Weston Electrical Instrument Corp., Newark 5, N. J.
339	*Wilcox Electric Company, Inc., Kansas City 27, Mo.
342	*The Zell Products Corp., Norwalk, Conn.
343	Zenith Radio Corporation, Chicago 39, Ill.
345	*The Astatic Corporation, Conneaut, Ohio
351	Symphonic Radio and Electronic Corp., Boston 14, Mass.
352	*Magnetic Windings Division, Essex Wire Corporation, Easton, Penna.
356	*R. Prescott & Son, Inc., Keeseville, N. Y.
357	*Teleradio Engineering Corporation, Wilkes Barre, Pa.
360	*Gavitt Wire & Cable Co., Division of American Hard Rubber Co., Brookfield, Mass.
366	New York Transformer Co., Inc., Alpha, N. J.
367	National Moldite Company, Hillside 5, N. J.
368	*Santay Corporation, Chicago 24, Ill.
369	*Stoddart Aircraft Radio Co., Hollywood 38, Calif
370	*Carr Fastener Company, Division of United-Carr Fastener Corp., Cambridge 42, Mass.
371	*Best Manufacturing Co., Inc., Irvington 11, N. J.
372	*Holyoke Wire and Cable Corporation, Holyoke, Mass.
375	*Webster-Chicago Corporation, Chicago 39, Ill.
376	Hazeltine Electronics Corporation, Little Neck, L. I., N. Y.
380	*Radio Receptor Company, Inc., New York 11, N. Y.
381	*The Ucinite Company, Newtonville 60, Mass.
382	Waters Conley Company, Rochester, Minn.
384	*Red Lion Cabinet Company, Red Lion, Pa.
385	*Dearborn Glass Company, Bedford Park, Ill.
391	Altec Lansing Corporation, Beverly Hills, Calif.
392	*The Wheeler Insulated Wire Company, Inc., Waterbury, 20, Conn.
394	*Foster Transformer Company, Cincinnati 23, Ohio
395	*Permoflux Corporation, Glendale 4, Calif.
396	General Cement Mfg. Co., Rockford, Ill.
397	*Gabriel Electronics Division, The Gabriel Company, Norwood, Mass.
402	Andrew Corporation, Chicago 19, Ill.
406	*Wirt Company, Philadelphia 44, Penna.
409	British Industries Corporation, New York 13, N. Y.
411	Hardwick, Hindle, Inc., Newark 5, N. J.
412	*General Transformer Company, Homewood, Ill.
413	*Acme Electric Corporation, Cuba, N. Y.
418	*United Transformer Corporation, New York 13, N. Y.
423	North American Philips Company, Inc., New York 17, N. Y.
425	*Essex Electronics, Berkeley Heights, N. J.
427	Communication Measurements Laboratory, Inc., Plainfield, N. J.
428	*Schulmerich Electronics, Inc., Sellersville, Penna.
430	Camburn, Inc., Woodside 77, N. Y.
431	Waterman Products Company, Inc., Philadelphia 25, Pa.
433	*Cleveland Electronics, Inc., Cleveland 3, Ohio
435	*Plastoid Corporation, Hamburg, N. J.
437	*Newcomb Audio Products Company, Hollywood 38, Calif.
438	The Gudeman Company, Chicago 10, Ill.
439	Collins Radio Company, Cedar Rapids, Ia.
440	Cannon Electric Company, Los Angeles 31, Calif.
442	J-B-T Instruments, Inc., New Haven 8, Conn.
445	*Mississippi Products, Inc., Jackson, Miss.
446	Good-All Electric Mfg. Co., Ogallala, Nebr.
450	*Columbus Process Co., Inc., Columbus, Ind.
452	*Empire Coil Company, Inc., New Rochelle, N. Y.
454	*Telequip Radio Company, Chicago 8, Ill.
457	Sprague Electric Company of Wisconsin, Inc., Grafton, Wis.
459	*General Communication Company, Boston 15, Mass.
461	Barker & Williamson, Inc., Upper Darby, Pa.
464	*Q. L. C. Corporation, Summit, N. J.
465	Oxford Electric Corporation, Chicago 15, Ill.
466	Delco Radio Division, General Motors Corporation, Kokomo, Ind.
467	Grigsby-Allison Company, Inc., Arlington Heights, Ill
472	*Pyramid Electric Company, North Bergen, N. J.
474	Special Products Company, Rockville, Md.
475	*Glass Products Company, Chicago 37, Ill.
476	*Airdesign, Incorporated, Upper Darby, Penna.
481	Harnett Electric Corporation, Port Washington, N. Y.
482	Rada Products Co., Chicago 12, Ill.
484	*Shurite Meters (J-B-T Instruments, Inc.), New Haven 8, Conn.
489	*Radio Television Products Corp., Grass Lake, Mich.
493	*Dormitzer Electric & Manufacturing Co. Inc., Cambridge 40, Mass.
494	Fidelity Products Co., Inc., So. Orange, N. J.
501	Standard Piezo Company, Carlisle, Pa.
502	*American Radio Hardware Co., Inc., Mt. Vernon, N. Y.
503	Caledonia Electronics & Transformer Corp., Caledonia, N. Y.
504	*The James Knights Company, Sandwich, Ill.
505	Precision Apparatus Company, Inc., Glendale 27, Long Island, N. Y.

Code No.	Company
507	John Volkert Metal Stampings, Inc., Queens Village 29, Long Island, N. Y.
508	The Hickok Electrical Instrument Co., Cleveland 8, O.
514	*Audio Electric Company, Chicago 26, Ill.
515	*Electronic Components Corporation, Chicago 8, Ill.
516	United Condenser Corporation, New York 56, N. Y.
517	Audak Company, Inc., New York 18, N. Y.
518	*Sampson Electric Products Co., Clinton, N. C.
520	Schneider & Marquard, Inc., Brooklyn 17, N. Y.
524	*Triwec Transformer Company, Chicago 18, Ill.
525	Crucible Steel Company of America, New York 17, N. Y.
527	Valpey Crystal Corporation, Holliston, Mass.
528	*Columbus Electronics Corporation, Yonkers, N. Y.
529	Wheeler Laboratories, Inc., Great Neck, N. Y.
530	Clippard Instrument Laboratory, Inc., Cincinnati 31, Ohio
532	*Ward Leonard Electric Co., Mount Vernon, N. Y.
535	Hedco Manufacturing Corporation, Chicago 10, Ill.
536	Tel-Instrument Co., Inc., Carlstadt, N. J.
538	*Pyroferric Company, New York 67, N. Y.
539	The Yale & Towne Manufacturing Co., Powdered Metal Products Division, Franklin Park, Ill.
540	*Radio Industries, Inc., Chicago 40, Ill.
541	Industrial Television, Inc., Clifton, N. J.
547	*Anaconda Wire & Cable Company, Hastings-On-Hudson 6, N. Y.
548	*B. J. Toegel, Inc., Plainfield, N. J.
549	*Mid-West Coil & Transformer Co., Chicago 14, Ill.
550	*Standard Winding Company, Newburgh, N. Y.
551	American Television & Radio Co., St. Paul 1, Minn.
552	Otis Radio & Electric Corp., Hawarden, Iowa
553	*Wesco Electric Company, Inc., Chicago 31, Ill.
554	American Phenolic Corporation, Chicago 50, Ill.
555	*Waldom Electronics, Inc., Chicago 10, Ill.
557	Electronic Products Company, Mt. Vernon, N. Y.
562	Polarad Electronics Corporation, Brooklyn 11, N. Y.
563	J. W. Davis & Company, Dallas 9, Texas
569	*Electrical Utilities Company, La Salle, Ill.
570	*Leonard Electric Products Co., Inc., Brooklyn 32, N. Y.
571	*General Cable Corporation, Perth Amboy, N. J.
572	*F. & V. Coil Winding Corporation, Newark 5, N. J.
573	Alcon Metal Products, Inc., Chicago 47, Ill.
574	*Stanwyck Winding Company, Newburgh, New York
575	*Heppner Manufacturing Company, Round Lake, Ill.
579	Belden Manufacturing Company, Chicago 44, Ill.
581	*Aircraft-Marine Products, Inc., Harrisburg, Pa.
582	General Precision Laboratory, Inc., Pleasantville, N. J.
583	*Tele King Corporation, New York 1, N. Y.
584	W. M. C. Inc., Chicago 47, Ill.
586	Drake Manufacturing Company, Chicago 22, Ill.
587	Radio Specialty Manufacturing Co., Portland 14, Ore.
588	Barnes Metal Products Company, Chicago 23, Ill.
589	David Bogen Co., Inc., New York 14, N. Y.
590	Shure Brothers, Inc., Chicago 10, Ill.
592	*Perfection Electric Company, Chicago 16, Ill.
593	Kip Electronics Corporation, Stamford, Conn.
594	*Kóbzy Tool Company, Chicago 22, Ill.
596	Gramer-Halldorson Transformer Corp., Chicago 39, Ill.
597	Stevens Wire Insulating Company, Chicago 39, Ill.
599	*Elco Corporation, Philadelphia 40, Pa.
603	Eltran Corporation, St. Anne, Ill.
604	The Staver Company Incorporated, Bay Shore, L. I.
606	*Woodward-Schumacher Electric Corp., Chicago 22, Ill.
607	Consolidated Wire & Associated Companies, Chicago 16, Ill.
608	*TELvision Laboratories, Inc., Wauconda, Ill.
610	Carter Parts Company, Chicago 10, Ill.
613	*Star Products Company, Chicago 16, Ill.
614	Simpson Electric Company, Chicago 44, Ill.
616	Illinois Condenser Co., Chicago 22, Ill.
617	RAM Electronics, Inc., Irvington-On-Hudson, N. Y.
618	*TV Products Division, Union Electric & Mfg. Co., Jersey City 7, N. J.
620	Kay Electric Company, Pine Brook, N. J.
624	Surprenant Mfg. Co., Boston 8, Mass.
628	*Davis Electric Company, Cape Girardeau, Mo.
631	Pickering and Company, Inc., Oceanside, N. Y.
632	*El-Rad Manufacturing Co., Chicago 18, Ill.
633	*American Television, Inc., Chicago 5, Ill.
634	*Todd Products Co., Inc., Mt. Vernon, N. Y.
635	*Todd-Tran Corp., Mt. Vernon, N. Y.
636	*Sheldon Electric Company, Div. of Allied Electric Products, Inc., Irvington 11, N. J.
637	*Central Coil Company, Inc., Indianapolis 22, Ind.
638	Industrial Development Engineering Associates, Inc., Indianapolis 26, Ind.
639	Johnson & Hoffman Manufacturing Co., Mineola, N. Y.
642	Mycalex Corporation of America, Clifton, N. J.
643	National Aeronautical Corporation, Ambler, Pa.
644	General Railway Signal Company, Rochester 2, N. Y.
647	Kimble Glass Company, Sub. of Owens-Illinois Glass Co., Toledo 1, Ohio
648	*American Radionic Co., Inc., Danbury, Conn.
649	Electro-Voice, Inc., Buchanan, Michigan
653	Wind Turbine Company, West Chester, Pa.
657	Lowell Manufacturing Company, St. Louis 17, Mo.
658	Sangamo Electric Company, Marion, Ill.
659	John R. Hollingsworth Corporation, Clifton Heights, Pa.
662	Weller Electric Corporation, Easton, Pa.
665	Penn Tran Corporation, Bellefonte, Penna.
666	Winsted Division, Hudson Wire Company, Winsted, Conn.
668	*Standard Electrical Products Co., Dayton 3, Ohio
670	Glaser-Steers Corporation, Belleville 9, N. J.
672	Thomas Electronics, Inc., Passaic, N. J.
674	Shoup Engineering Company, Chicago 4, Ill.
677	*Rogers Electronic Corp., New York 12, N. Y.
678	Rhode Island Insulated Wire Co., Inc., Cranston, R. I.
679	*Tech-Master Corporation, New York 13, N. Y.
680	Conrac, Incorporated, Glendora, Calif.
681	*American Lava Corporation, Chattanooga 5, Tenn.
682	*Electrical Windings, Inc., Chicago 39, Ill.
683	Wright Zimmerman, Inc., New Brighton, Minn.
684	*Sarkes Tarzian, Inc., Bloomington, Ind.
686	H. S. Martin & Company, Evanston, Ill.
687	*Hillburn Electronic Products Co., Brooklyn 22, N. Y.
688	*Trad Television Corporation, Asbury Park, N. J.
689	*Aladdin Radio Industries, Inc., Nashville, Tenn.
692	CELCO (Constantine Engineering Laboratories Co.), Mahwah, N. J.
693	Multi-Tron Laboratory, Chicago 44, Ill.
694	Standard Electronics Corporation, Newark 5, N. J.
695	Basler Electric Company, Highland, Ill.
696	The Turner Company, Cedar Rapids, Ia.
697	*Phalo Plastics Corporation, Worcester 8, Mass.
698	Sheffco Mfg. Corp., Palisades Park, N. J.
699	Keystone Electronics Company, Stamford, Conn.
700	*The Radion Corporation, Chicago 14, Ill.
701	Forbes & Wagner, Inc., Silver Creek, N. Y.
702	Radio Apparatus Corporation, Indianapolis 26, Ind.
703	Prodelin, Inc., Kearny, N. J.
704	Cosmic Radio Corporation, New York 59, N. Y.
705	*Ajax Condenser Co., Inc., Chicago 14, Ill.
706	Pioneer Electronics Corporation, Santa Monica, Calif.
707	*Anchor Electronics Inc., Union City, N. J.
708	Bell Sound Systems, Inc., Columbus 7, Ohio
709	*The Rodefer Glass Company, Bellaire, Ohio
710	*Standard Condenser Company, Chicago 13, Ill.
711	*Soreng Products Corporation, Schiller Park, Ill.
713	Taylor Tubes, Inc., Chicago 47, Ill.
717	Arthur Ansley Manufacturing Co., Doylestown, Pa.
719	*Carbonneau Industries, Inc., Grand Rapids 4, Mich.
720	Methode Manufacturing Corp., Chicago 47, Ill.
721	*Rollan Electric Co., Chicago 19, Ill.
722	Milwaukee Resistor Co., Milwaukee 4, Wis.
724	Jeffers Electronics Division, Speer Carbon Company, Dubois, Penna.
725	*Copperweld Steel Company, Glassport, Penna.
726	Penn Television Products Co., Philadelphia 34, Pa.
729	*The American Woodworking Co., West Haven 16, Conn.
730	Jersey Specialty Co., Inc., Mountainview, N. J.
732	Radio Materials Corporation, Chicago 13, Ill.
733	Alpha Metals, Inc., Jersey City 4, N. J.
734	Fretco Incorporated, Pittsburgh 13, Penna.
735	*The Formatic Company, Naugatuck, Conn.
736	*Paul & Beekman, Inc., Philadelphia 40, Pa.
737	*Technical Appliance Corp., Sherburne, N. Y.
738	Lewis and Kaufman, Ltd., Los Gatos, Calif.
739	Oak Electronics Company, Buffalo 3, N. Y.
740	Olympic Metal Products Co., Inc., Alpha 1, N. J.
741	The Whitney Blake Company, New Haven 14, Conn.
742	*Esquire Radio Corporation, Brooklyn 19, N. Y.
743	*Madisco, Inc., Philadelphia 40, Penna.
744	Hughes Aircraft Company, Culver City, Calif.
745	*Tempel Manufacturing Company, Chicago 26, Ill.
746	*L. H. Frost & Co., Inc., Grand Rapids 8, Mich.
748	*Russell Speaker Company, Chicago 29, Ill.
749	*National Electronics, Incorporated, Geneva, Ill.
750	Mosley Electronics, Incorporated, St. Louis 14, Mo.
752	Electronic Devices, Inc., Brooklyn 15, N. Y.
756	Universal Company, High Point, N. C.

Code No.	Company
757	*Grand Transformers, Inc., Grand Haven, Mich.
760	*Co-Operative Industries, Inc., Chester, N. J.
761	*Planet Manufacturing Corp., Bloomfield, N. J.
762	Erca Tool Die & Stamping Co., Brooklyn 22, N. Y.
767	Quincy Speaker Manufacturing Corp., Quincy, Ill.
768	Crest Laboratories, Incorporated, Rockaway Beach 93, N. Y.
769	National Electric Products Corp., Pittsburgh 22, Penna.
770	Stone City Machine & Tool Co., Bedford, Ind.
771	Penta Laboratories, Inc., Santa Barbara, Calif.
772	*Muntz TV, Inc., Chicago 13, Ill.
773	*The Forest Electric Company, Forest Park, Ill.
774	Macon Electronics, Div. of York Radio & Television Corp., Warrenburg, Ill.
775	*Electro-Mechanical Products Corp., Riverhead, N. Y.
776	*Ogden Coil & Transformer Co., Chicago 12, Ill.
779	*Custom Parts Corporation, Mattituck, N. Y.
780	DeJur-Amsco Corporation, Long Island City, N. Y.
781	Vacuum Tube Products, Oceanside, Calif.
782	Spencer Kennedy Laboratories, Inc., Cambridge 39, Mass.
783	Eldico of New York, Inc., Mineola, Long Island, N. Y.
784	Johnson Electronics Inc., Orlando, Fla.
785	*Worthco Corporation, Beverly Hills, Calif.
786	*Hinners-Galanek Radio Corporation, Long Island City 6, N. Y.
787	*Sonotone Corporation, Elmsford, N. Y.
789	McGregor Electronic Industries, Inc., McGregor, Ia.
791	Hopkins Engineering Company, Altadena 3, Calif.
792	Atlantic Wire & Cable Company, College Point 56, N. Y.
793	McIntosh Laboratory, Inc., Binghamton, N. Y.
794	Harman-Kardon, Inc., Westbury, Long Island, N. Y.
795	G & H Wood Products Company, Brooklyn 11, N. Y.
796	*Richmond Radionics Corp., Delavan, Wis.
797	Vidaire Electronics Mfg. Co., Lynbrook, L. I.
799	*California Magnetic Control Corp., North Hollywood, Calif.
802	Tempo T-V Products Company, Los Angeles 47, Calif.
803	Microwave Associates, Inc., Boston 15, Mass.
804	*Union Electric & Manufacturing Company, Jersey City 7, N. J.
806	*Mark Electronics Inc., Newark 2, N. J.
807	*General Dry Batteries, Inc., Cleveland 7, O.
808	*Henald Manufacturing Co., Piper City, Ill.
809	Varian Associates, Palo Alto, Calif.
810	Translite Electronics Corp., Chicago 39, Ill.
811	Continental Electronics Corp., Philadelphia 31, Penna.
812	*Bradley Laboratories, Inc., New Haven 11, Conn.
813	Adler Communications Laboratories, New Rochelle, N. Y.
814	Antenna & Mounting Hardware Co., Franklin Park, Ill.
815	San Fernando Electric Mfg. Co., San Fernando, Calif.
816	Dale Products, Inc., Columbus, Nebr.
817	Brubaker Manufacturing Company, Inc., Los Angeles 34, Calif.
818	*Tel-O-Tube Corporation of America, East Paterson, N. J.
819	Z & W Machine Products Inc., Cleveland 3, O.
820	*United Electronic Manufacturing Corp., Union City, N. J
822	*Syntronic Instruments, Inc., Addison, Ill.
824	*Videocraft Manufacturing Co., Chicago 39, Ill.
825	*Thermador Electrical Mfg. Co., Los Angeles 22, Calif.
827	*The Allen D. Cardwell Mfg. Corp., Plainville, Conn.
828	Midland Manufacturing Co., Inc., Kansas City 15, Kan.
829	Radell Corporation, Indianapolis 26, Ind.
830	*Triad Transformer Corporation, Venice, Calif.
831	*Better Coil & Transformer Corp., Goodland, Ind.
832	McCoy Electronics Co., Mt. Holly Springs, Penna.
834	*Mel-Rain Corporation, Indianapolis 4, Ind.
835	*Ratel, Inc., Monrovia, Calif.
836	*National Video Corporation, Chicago 32, Ill.
837	*Carol Electronics Corporation, Martinsburg, W. Va.
838	*Carson Manufacturing Company, Indianapolis 18, Ind.
840	Orradio Industries, Inc., Opelika, Ala.
841	Central Sales & Manufacturing Corp., Denville, N. J.
842	The Tetrad Company, Yonkers 2, N. Y.
843	Klipsch & Associates, Hope, Ark.
844	Rectifier Corporation, Fajardo, Puerto Rico
845	International Rectifier Corporation, El Segundo, Calif.
847	University Loudspeakers, Inc., White Plains, N. Y.
848	Onondaga Pottery Company, Syracuse 1, N. Y.
850	Chromatic Television Laboratories, Inc., New York 36, N. Y.
851	R. L. Drake Company, Dayton 2, Ohio
852	Andrew's Tower, Inc., Fort Worth 11, Tex.
854	T J Mfg. Corporation, Martinsville, Ind.
855	International Instruments Inc., New Haven 15, Conn.
856	Transistor Products, Inc., Waltham 54, Mass.
857	*V-M Corporation, Benton Harbor, Mich.
859	U M & F Manufacturing Corporation, North Hollywood, Calif.
860	Avionex Electronics Corporation, Burbank, Calif.
861	Don Good Inc., South Pasadena, Calif.
862	Cal-Tronics Corporation, Los Angeles 45, Calif.
863	*James Vibrapowr Company, Chicago 18, Ill.
865	Davis Electronics Co., Burbank, Calif.
866	*Industrial Hardware Manufacturing Co., Inc., New York 12, N. Y.
867	C-B-C Electronics Co., Inc., Philadelphia 23, Penna.
868	Telechrome Incorporated, Amityville, N. Y.
869	Kline Iron and Metal Company, Columbia, S. C.
870	Cubic Corporation, San Diego 6, Calif.
871	Precision Electronics Inc., Franklin Park, Ill.
872	S & A Electronics, Toledo 5, Ohio
874	Tristao Manufacturing Company, Kansas City 6, Mo.
875	Kay-Townes Antenna Company, Rome, Ga.
876	Phen-O-Tron, Inc., New Rochelle, N. Y.
877	Hydro-Aire, Inc., Sub. of Crane Co., Burbank, Calif.
878	Acro Products Company, Philadelphia 28, Penna.
879	Litton Industries, Beverly Hills, Calif.
880	Thomas Associates, Los Angeles 38, Calif.
881	Unitek Corporation, Pasadena 8, Calif.
882	Plamondon Magnetics Company, Chicago 22, Ill.
883	*Mohawk Electronics Corp., Chicago 10, Ill.
884	*C R T Electronics Corp., Mt. Vernon, N. Y.
885	Condenser Manufacturers, Inc., Nashville 4, Tenn.
886	Calvideo Tube Corporation, Los Angeles 45, Calif.
887	International Telemeter Corporation, Los Angeles 25, Calif.
888	Connector Corporation, Chicago 30, Ill.
889	*Polyphase Engineering, Chicago 22, Ill.
890	Wire Company of America, Santa Barbara, Calif.
891	Southern Electronics Company, Greeneville, Tenn.
892	*American Transformer Corp., Chicago 7, Ill.
893	Elcon Electronics Inc., Brooklyn 32, N. Y.
894	Hy-Gain Television Products, Lincoln, Nebr.
895	*Dinion Coil Co., Inc., Caledonia, N. Y.
896	Viking Electric, Los Angeles 17, Calif.
897	Tresco (Transformer and Electronic Specialties Co.), Philadelphia 28, Penna.
898	Consolidated Vultee Aircraft Corp., Pomona, Calif.
900	ACF Electronics, Division of ACF Industries, Inc., Alexandria, Va.
901	Cargo Packers Inc., Brooklyn 11, N. Y.
902	Elgin Metalformers Corporation, Elgin, Ill.
903	D & M Products, Detroit 35, Mich.
904	Pan-Electronics Corporation, Atlanta, Ga.
905	Allied Research & Engineering, Inc., Hollywood 38, Calif.
906	*Coilcraft, Incorporated, Cary, Ill.
907	*Senn Corporation, New Augusta, Ind.
908	*Aerocoil, Inc., Jersey City, N. J.
909	*Chester Cable Corp., Chester, N. Y.
910	*Aerolite Electronics Corp., Union City, N. J.
911	International Electronic Industries Inc., Nashville 11, Tenn.
912	*I-T-E Circuit Breaker Company, Philadelphia 30, Penna.
913	General Products Corporation, Union Springs, N. Y.
914	*Centran Incorporated, Div. of Central Coil, Greensburg, Ind.
915	*Rollins Corporation, Lewes, Del.
916	Texas Electronics Mfg. Co., Inc., Houston, Tex.
917	Resitron Laboratories, Inc., Los Angeles 25, Calif.
918	*Oaktron Industries Inc., Monroe, Wis.
919	Richardson Company, Hollywood 28, Calif.
920	The Antenna Specialists Co., Cleveland 6, Ohio
921	Technical Training Institute, Portland 11, Ore.
922	Standard Television Tube Corp., New Orleans 12, La.
923	Jerrold Electronics Corporation, Philadelphia 46, Penna.
924	Germanium Products Corporation, Sub. of Radio Development & Research Corp., Jersey City 4, N. J.
925	Kay Lab, San Diego 10, Calif.
926	*Todd Electric Company, Inc., Yonkers, N. Y.
927	General Mills, Inc., Mechanical Division, Minneapolis 13, Minn.
928	*Acme Coil & Transformer Corp., Chicago 14, Ill.
929	Parker Metal Goods Company, Worcester, Mass.
930	Raytronic Laboratories, Inc., Cincinnati 15, Ohio
931	Skiatron Electronics & TV Corp., New York 3, N. Y.
932	Atlas Resistor Co., Philadelphia 44, Penna.
933	*Magnetic Coil Manufacturing Company, Chicago 22, Ill.
934	*Oaktron Electric Company, Tinley Park, Ill.
935	*Electrons, Incorporated, Newark 3, N. J.
936	*Hamilton-Hall Mfg. Company, Milwaukee 2, Wis.
937	*Polan Industries, Inc., Huntington 19, W. Va.

L. F. U.
3934 W
DENVER, COLORADO

The PHOTOFACT Servicer

Vol. 29. Nos. 283 & 284 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ May 1, 1955

FIELD EXPERIENCES

For every "Field Experience" published, we issue a certificate good for one PHOTOFACT Folder Set. Awards are issued at the time of publication. Since it is impossible to verify the accuracy of contributions, we cannot be responsible for either the diagnosis made of the receiver trouble, or the results which will be obtained by following the suggested repair routine. All contributions become the property of Howard W. Sams & Co., Inc.

ARVIN Model 2120 CM (Ch. TE289-2, TE289-3)
PHOTOFACT Set No. 120, Folder No. 3
(Also PCB 20- Set 134-1)

Complaint: Intermittent loss of synchronization and retrace lines present most of time.

Analysis: Voltage and resistance readings were all normal. Associated components all checked okay. An insulated probe was used to move components in the suspected circuits. Movement of C73, sync coupling capacitor, restored normal operation. In its original position both leads of this capacitor were across and adjacent to the leads going to the TV-Phono switch mounted on the rear of the chassis.

Remedy: Reposition capacitor, C73, away from leads going to TV-Phono switch.

George A. Robertson
916 West 31st St.
Richmond 25, Virginia

ZENITH Model K2230E (Ch. 21K20)
PHOTOFACT Set 187 Folder 14

Complaint: Intermittent raster caused by loss of high voltage, sound normal. Set operated for 15 or 20 minutes before loss of raster. Raster would reappear after turning receiver off and allowing time for cooling before turning set on again.

Analysis and Repair: Tubes were checked in tube tester. All tubes checked okay. Tubes in horizontal and high voltage sections were tapped after set had warmed up. Tapping of 6SN7GT (V14) caused loss of raster. Replacement of 6SN7GT returned set to normal operation.

Jack P. Goldsmith
% W. Martin
Miner Farm
Chazy, New York

PHILCO Model 50T1403 (Code 125)
PHOTOFACT Set 115, Folder 8

Complaint: No raster caused by no high voltage, sound normal.

Analysis: Checking revealed trouble was in the Horizontal Oscillator stage. Testing of components showed C91 (150 mmf) to be leaky. All other components checked okay.

Repair: Replaced 150 mmf capacitor. Receiver restored to normal operation.

MAJESTIC Model 120
PHOTOFACT Set 127, Folder 7
(Also PCB 37 - Set 166-2)

Complaint: Receiver operates normally when first turned on. Sound then fades and loss of raster caused by no high voltage.

Analysis: Decision was made to check first for cause of loss of high voltage. Removing the 6W4 while set was in operation restored sound to normal. The 6W4 checked good and a further check revealed the damper filter (C61) to be shorted. This placed abnormal load on B plus causing fading of sound.

Repair: Replace C61 with new .035 capacitor.

EDITOR'S NOTE: Both the above field experiences were contributed by:

Jerry's Radio Service
2333 Eiler Ave.
Pittsburgh 10, Pennsylvania

ADMIRAL Chassis 24D1
PHOTOFACT Set 103, Folder 2

Complaint: Picture jumping vertically, sync buzz in sound.

Analysis and Repair: Stopping of vertical oscillator or removal of vertical output tube would clear sound. Check of all tubes, capacitors and resistors showed all to be okay. Substitution of vertical output transformers was the remedy.

S. P. Dolter
425 Smiley St.
Ellwood City, Pennsylvania

RAYTHEON Model C-1724A
PHOTOFACT Set 124, Folder 8

Complaint: No sound, no raster.

Analysis and Repair: Power transformer was shorted out. Check was made for shorts in B+ line. Everything check okay. Replaced power transformer with recommended unit and replaced 5U4G rectifier.

CAPEHART Model 339MX
PHOTOFACT Set 160, Folder 2

Complaint: No sound.

Analysis: Voltage, check revealed no voltage at plate and screen of V10, audio output (6K6GT). R44 and R45 were both open. Further checking revealed this had been caused by C5 shorting.

Repair: Replaced C5, R44 and R45.

WESTINGHOUSE Model H668T17
PHOTOFACT Set 167, Folder 15

Complaint: Arcing sound -- flashes across picture -- then loss of raster.

Analysis: Voltage measurement showed intermittent high voltage. Resistance check showed R115 to be 100K and R116 infinite. Replaced both resistors with proper 330K values. Set then worked for about ten minutes, then faded out. Checking revealed no high voltage. Substituted tube V18, 6AV5, This restored set to normal operation.

EDITOR'S NOTE: The above field experiences were contributed by:

Dale W. Bird
Bird Electronics
1703 Sheffield Road
Oklahoma City, Oklahoma

BENDIX Models C172, C200
PHOTOFACT Set 134, Folder 5

Complaint: Double image with half picture on left and half on right of screen.

Analysis: Symptom indicated trouble to be in Horizontal Phase Detector (V16) stage. Check of voltage pointed to leaky capacitor, C62.

Remedy: Replace capacitor, C62, with new 68mmf unit.

GENERAL ELECTRIC Models 17C110, 17C111
PHOTOFACT Set 180, Folder 5

Complaint: Poor contrast with picture and sound fluctuating in and out at various intervals.

Analysis: Voltage check indicated low voltage on screen of V7 (Video output). Resistance measurement showed R41 had increased in value. Capacitors connected to screen of V7 checked okay.

Repair: Replaced R41.

EDITOR'S NOTE: Both the above field experiences were contributed by:

Carleton Phillips
Riverside Enterprises,
Riverside
Corning, New York

BOOK REVIEW

TRANSISTORS: Theory and Application

Authors: Messrs. Abraham Coblenz and Harry L. Owens

Published by: McGraw-Hill Book Company, Inc. New York 10, N. Y.

340 Pages -- $6.00

The Authors' experience with the Signal Corps working on the developments and applications of Transistors provides a firm background for an excellent presentation. This book is based on lectures given at the Evans Signal Laboratory and later expanded into a series of articles appearing in Electronics Magazine.

An orderly outline is followed, taking the reader step-by-step through history and fundamentals, circuits, manufacturing, testing and evaluating of both Silicon and Germanium types.

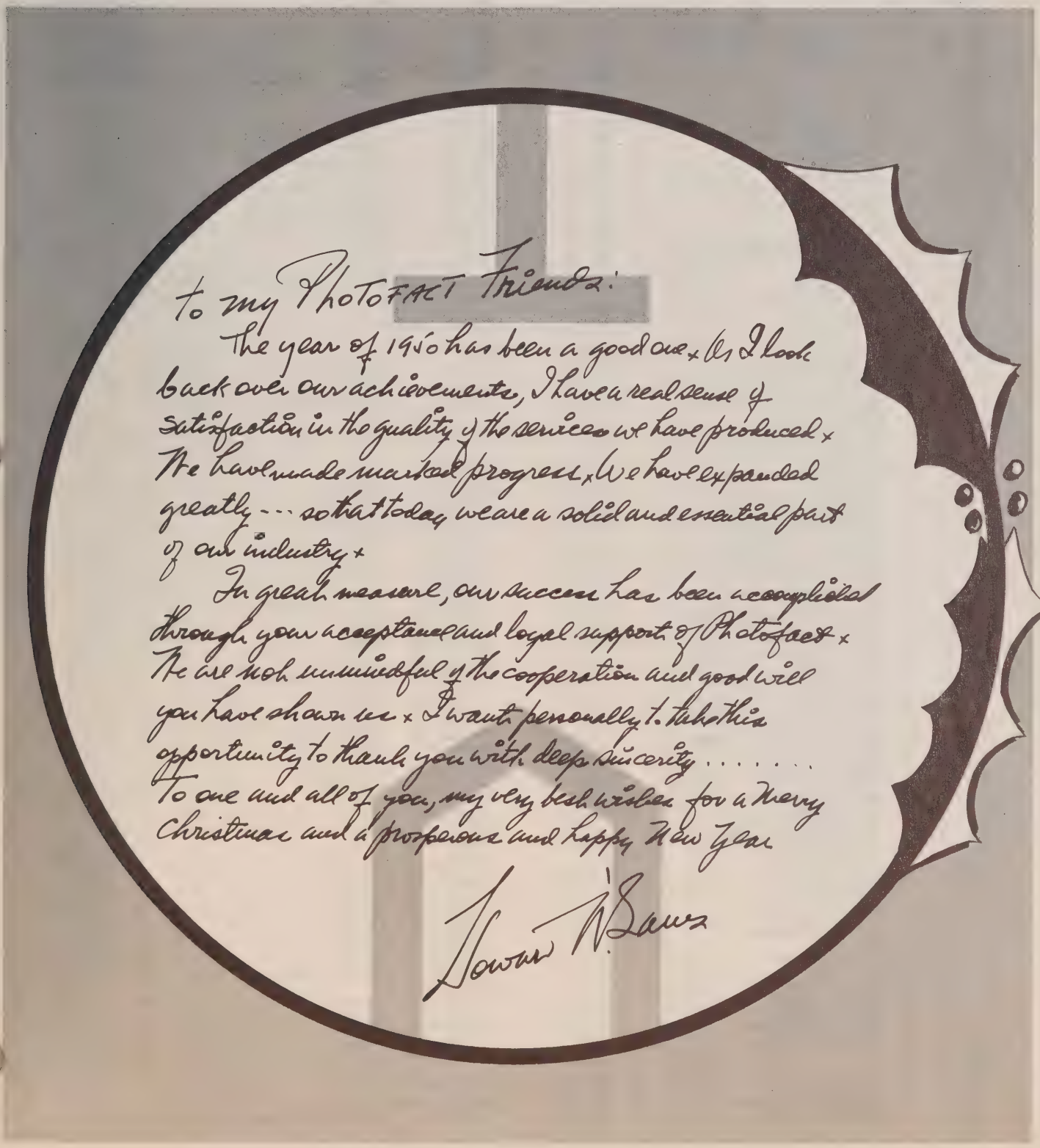
Adequate information on such topics as cascading of transistors, power transistors, high frequency transistors and related subjects is included.

The theoretical matter is presented with a minimum of mathematics and with emphasis on applications making it interesting reading for the electronics technician who wishes to learn more about this new and fascinating field.

The PHOTOFACT Servicer

December 15, 1950 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ Vol. 12, Nos. 117 & 118

"The man who wakes to find himself famous hasn't been asleep." - Anon.



To my PHOTOFACT Friends:

The year of 1950 has been a good one. As I look back over our achievements, I have a real sense of satisfaction in the quality of the services we have produced. We have made marked progress. We have expanded greatly ... so that today we are a solid and essential part of our industry.

In great measure, our success has been accomplished through your acceptance and loyal support of Photofact. We are ever mindful of the cooperation and good will you have shown us. I want personally to take this opportunity to thank you with deep sincerity .....

To one and all of you, my very best wishes for a Merry Christmas and a prosperous and happy New Year.

Howard W. Sams

The purpose of the following cross reference material is to provide greatest utility for record changer, disc recorder, and wire or tape recorder service operations through the use of Photofact publications containing applicable data (Record Changer Manuals No. 1 - - 1947, No. 2 - - 1948, and No. 3 - - 1949-1950; also coverage supplied in Photofact Folders). The table is arranged in the order of Brand Name and Model Number of the radio receiver, amplifier, or television receiver in which changer or recorder equipment is used.

This cross reference cannot be considered as covering all variations of changers used in the receivers listed. Receiver manufacturers frequently employ more than one supply source for changer equipment during the production run. Accordingly, it is entirely possible that you may find a different changer in the receiver than the one listed in this cross reference index. In such a case, we suggest that you review the pictures of the changers in the three Record Changer Volumes, or the Photofact Folders, in order to locate the service information on an identical or similar record changer.

Trade Name and Model	Changer Name and Model	Changer Vol.	Manual Sec.	Photofact Set	Photofact Folder
ADMIRAL					
Chassis					
3A1	Admiral RC 160	1	5	2	24
4H1	See Chassis 30B1				
4J1, 4K1	See Chassis 20A1				
5B1	Admiral RC160	1	5	1	20
5B1A	Admiral RC160	1	5	18	1
5T1	Admiral RC170, RC170A	1	4	68	1
6B1	Admiral RC170, RC170A	1	4	48	2
6L1	Admiral RC170, RC170A	1	4	26	2
6M1	Admiral RC170, RC170A	1	4	25	1
6R1	Admiral RC170, RC170A	1	4	54	1
6V1	Admiral RC212	3	90	62	1
6W1	Admiral RC212	3	90	71	1
7B1	Admiral RC160	1	5	18	2
7C1	Admiral RC170, RC170A	1	4	25	2
7E1	Admiral RC170, RC170A	1	4	36	1
7G1	Admiral RC182	2	44	54	2
8D1	Admiral RC210	3	90	67	1
9A1	Admiral RC170, RC170A	1	4	32	1
9B1	Admiral RC170, RC170A	1	4	49	2
9E1	Admiral RC210	3	90	68	2
10A1	Admiral RC200	1	5	3	30
20A1, 20B1	Admiral RC221, RC222	3	91	77	1
	Admiral RC321	3	92	77	1
21A1	See Chassis 20A1				
30B1, 30C1, 30D1	Admiral RC180, 181	2	44	71	2
	Admiral Supplement RC182	2	44	76	2
Model	7G11, 7G12, 7G13, 7G14, 7G15, 7G16 (See Chassis 7G1)				
	8D15, 8D16 (See Chassis 8D1)				
	7C73 (See Chassis 9A1)				
	9B14, 9B15, 9B16 (See Chassis 9B1)				
	9E15, 9E16, 9E17 (See Chassis 9E1)				
	6C71 (See Chassis 10A1)				
	4H15A or B, 4H16A orB, 4H17A orB, 4H126A, B, C or CN, 4H137A or B, 4H145A or B, 4H146A or B, 4H147A or B, 4H155A or B, 4H156A or B, 4H157A or B, 4H165A or B, 4H166A or B, 4H167A or B, 30F15, 30F15A, 30F16, 30F16A, 30F17 and 30F17A. (See Chassis 20A1, 20B1, 21A1)				
	4H15, 4H16, 4H17, 4H18, 4H19, 4H115, 4H116, 4H117, 4H126, 4H137, 4H145, 4H146, 4H147, 4H155, 4H156, 4H157, 4H165, 4H166, 4H167 - Use Admiral Record Changer RC210, RC211 or RC212.				
	8C11, 8C12, 8C13 - Use Admiral Record Changer RC180, RC181 or RC182. (See Chassis 30B1, 30C1, 30D1)				
	6RP48 (See Chassis 3A1)				
	6RT41, 6RT42, 6RT43, (See Chassis 5B1)				
	6RT41A, 6RT42A, 6RT43A, (See Chassis 5B1A)				
	5T12 (See Chassis 5T1)				
	5W11, 5W12 (See Chassis 5W1)				
	7C60B, 7C60M, 7C60W (See Chassis 6B1)				
	7RT41, 7RT42, 7RT43 (See Chassis 6L1)				
	7C61, 7C62, 7C62UL (See Chassis 6M1)				
	6R11 (See Chassis 6R1)				
	6V11, 6V12 (See Chassis 6V1)				
	6W11, 6W12 (See Chassis 6W1)				
	6RT44 (See Chassis 7B1)				
	7C63 (See Chassis 7C1)				
	7C65B, 7V65M, 7C65W (See Chassis 7E1)				
AIRCASTLE					
7B	Seeburg K	1	25	52	1
572	Crescent 350	2	50	55	1
604	Milwaukee-Erwood 11200	2	59	55	3
626	Utah 550	1	32	18	3

Trade Name and Model	Changer Name and Model	Changer Vol.	Manual Sec.	Photofact Set	Photofact Folder
AIRCASTLE (Continued)					
641	Seeburg K	1	25	17	1
6042	Aviola 100	1	7	61	1
6050	Aviola 100	1	7	74	1
6547	Seeburg K	1	25	17	2
6611	Seeburg K	1	25	15	2
6612	Seeburg K	1	25	15	2
6613	Seeburg K	1	25	15	2
6630	Seeburg K	1	25	15	2
6631	Seeburg K	1	25	15	2
6632	Seeburg K	1	25	15	2
6634	Seeburg K	1	25	15	2
6635	Seeburg K	1	25	15	2
10024-1	Milwaukee-Erwood 11200	2	59	58	2
121104	Milwaukee-Erwood 11200	2	59	73	1
121124	Milwaukee-Erwood 11200	2	59	61	2
127084	Milwaukee-Erwood 10700	1	18	55	2
138104	Milwaukee-Erwood 11200	2	59	54	3
138124	Milwaukee-Erwood 11200	2	59	64	1
150084	Milwaukee-Erwood 11200	2	59	71	4
G-518	V-M 800	1	37	48	3
G-725	V-M 800	1	37	50	1
WRA-4M	Milwaukee-Erwood 11200	2	59	60	1
WRA1-A	Aero Metal 46A	1	6	47	1
AIR CHIEF (See Firestone)					
AIR KING					
800	V-M 402	2	73	66	1
4700	Crescent 1000 Series	2	51	39	1
4704	Oak 6666	1	20	12	2
A725	Crescent 1000 Series	2	51		
AIR KNIGHT					
N5-RD291	Crescent 200 Series	1	10	17	3
AIR LINE					
54WG-2700A	Webster 50	1	38	4	15
64BR-7300A	General Instrument 205	1	15	54	4
64BR-7310A	General Instrument 205	1	15	54	4
64BR-7320A	General Instrument 205	1	15	54	4
64BR-7810A	General Instrument 205	1	15	53	3
64BR-7820A	General Instrument 205	1	15	53	3
64WG-2009A	General Instrument 205	1	15	6	2
64WG-2009B	General Instrument 205	1	15	6	2
64WG-2010B	Seeburg K	1	25	18	6
74BR-2701A	General Instrument 204	1	14	24	5
74BR-2702B	General Instrument 204	1	14	25	3
74GSG-8810A	Seeburg K	1	25	52	2
74GSG-8820A	Seeburg K	1	25	52	2
74KR-2706B	V-M 800	1	37	35	1
74KR-2713A	V-M 800	1	37	43	2
74WG-2002A	General Instrument 205	1	15	26	4
74WG-2704A	V-M 800	1	37	27	2
74WG-2709A	V-M 800	1	37	6	2
84GAA-3867A	General Industries R90	1	12	91	3
84GDC-963B	Crescent 250 Series	2	49	51	3
84GDC-987A	Crescent 250 Series	2	49	53	4
84GSE-2731A	Crescent 350 Series	2	50	70	1
84WG-2015A	Webster 148	2	77	38	1
84WG-2712A	Webster 70	1	40	43	3
84WG-2714A	V-M 800	1	37	36	2
84WG-2714, F, G, H, J	V-M 800	1	37	56	5
84WG-2718A, B	Webster 56	1	39	45	5
84WG-2720A	Webster 56	1	39	45	5
84WG-2721A, B	V-M 800	1	37	46	3
84WG-2724A	Webster 56	1	39	45	5
94BR-2740A	V-M 800-D	2	75	89	1
94BR-2741A	V-M 802	3	109	89	1
94BR-2741B	V-M 407	3	108	89	1
94GSE-2735A	Crescent 350 Series	2	50	72	3
94GSE-2736A	Crescent 350 Series	2	50	72	3
94WG-2742A, C, D	V-M 802	3	109	71	5
94WG-2745A	V-M 402-D	2	74	76	4
94WG-2748A	V-M 406	3	108	90	1
94WG-2749A	V-M 407	3	108	90	1
94WG-3008A	Webster 256	2	79	72	4
ALLIED RADIO (See Knight)					
AMPLIFIER CORP. OF AMERICA					
710-A	International Electronics PT3	2	55		

Trade Name and Model	Changer Name and Model	Changer Manual Vol.	Sec.	Photofact Set	Folder
AMPLIFIER CORP. OF AMERICA (Continued)					
710-B	International Electronics PT3	2	55		
710-C	International Electronics PT3	2	55		
808	International Electronics PT3	2	55		
810-B	International Electronics PT3	2	55		
ANDREA					
CO-U15	Oak 6666	1	20	27	3
ANSLEY					
53	Webster 50	1	38	24	8
APEX					
192-A	Utah 650	1	33	17	6
ARIA					
554-1-61A	Utah 550	1	32	7	2
ARVIN					
150-TC	General Instrument 205	1	15	(early - 39	2
				(late - 25	7
151-TC	General Instrument 205	1	15	(early - 39	2
				(late - 25	7
665	General Instrument 205	1	15	18	10
ASTRA-SONIC					
748	Crescent 1000 Series	2	51	53	6
AUDAR					
P-4A	Crescent 200 Series	1	10	19	3
P-5	V-M 200B	1	35	5	11
RE-8A	General Industries R90	1	12	25	8
Telvar RER.9	General Industries RC130, RC130L	1	13	65	2
AUTOMATIC					
677	Seeburg K	1	25	22	7
AVIOLA					
608	Aviola 100	1	7	16	6
618	Aviola 100	1	7	16	6
BELL SOUND					
RC-47 (Re-Cord-O-Fone)	General Industries R90	1	12	30	3
BELMONT					
5D-110	Utah 550	1	32	22	10
8A59	General Instrument 205	1	15	6	4
BENDIX					
69M8	V-M 800	1	37	63	3
75M8	Misc. Series 700FS	2	87	59	5
79M7	V-M 800-D	2	75	66	3
95M3	Misc. Series 700F	2	86	60	7
613	General Instrument 205	1	15	40	3
656A	General Instrument 205	1	15	2	31
676B	General Instrument 205	1	15	5	23
676C	General Instrument 205	1	15	5	23
676D	General Instrument 205	1	15	5	23
697A	Milwaukee-Erwood 10700	1	18	26	8
736B	General Instrument 205	1	15	10	8
847B	Farnsworth P-51	1	11	27	5
1217	Farnsworth P-51	1	11	29	4
1217B	Farnsworth P-51	1	11	29	4
1217D	Farnsworth P-51	1	11	29	4
1518	Webster 56	1	39	37	3
1519	Webster 56	1	39	37	3
1524	Webster 56	1	39	37	3
1525	Webster 56	1	39	37	3
1521	Webster 50	1	38	42	4
1531	General Instrument 205	1	15	43	6
1533	General Instrument 205	1	15	43	6
BRUNSWICK					
BJ-6836	Webster 50	1	38	28	4
C-3300	Webster 50	1	38	28	4
D-1000	Webster 56	1	39	56	7
D-1100	Webster 56	1	39	56	7
D-6876	Farnsworth P-51	1	11	29	5
T-4000	Farnsworth P-51	1	11	29	5
T-4000-1/2	Farnsworth P-51	1	11	29	5
T-4400-1/2	Webster 56	1	38	61	4
T-9000	Webster 56	1	38	56	7
CAPEHART					
19N4	Farnsworth P-72	2	52	65	3
21P4	Farnsworth P-72	2	52	65	3
24N4	Farnsworth P-72	2	52	65	3
24P4	Farnsworth P-72	2	52	65	3
26N4	Farnsworth P-72	2	52	65	3
29P4	Farnsworth P-72	2	52	65	3
30P4	Farnsworth P-72	2	52	65	3
31N4	Farnsworth P-72	2	52	65	3
31P4	Farnsworth P-72	2	52	65	3

Trade Name and Model	Changer Name and Model	Changer Manual Vol.	Sec.	Photofact Set	Folder
CAPEHART (Continued)					
32P9	Farnsworth P-72	2	52	64	3
33P9	Farnsworth P-72	2	52	64	3
34P10	Farnsworth P-72	2	52	64	3
114N4	Farnsworth P-72	2	52	65	3
116N4	Farnsworth P-72	2	52	65	3
116P4	Farnsworth P-72	2	52	65	3
118P4	Farnsworth P-72	2	52	65	3
501-P	Farnsworth P-72	2	52		
CENTURY (20th)					
300	Oak 6666	1	20	21	6
CLARION					
C-101	Utah 550	1	32	5	9
C-105-A	General Instrument 205	1	15	6	7
11305	Milwaukee-Erwood 10700	1	18	18	11
12110-M	Webster 50	1	38	54	5
12310-W	Milwaukee-Erwood 10700	1	18	31	6
12708	Utah 650	1	33	41	5
COMMANDER					
3 Tube Record Player	Milwaukee-Erwood 10700	1	18	17	10
CONCORD					
CD61P	Utah 550	1	32	19	9
6R3ARC	Aero Metal 46A	1	6	21	7
7R3APW	Aero Metal 46A	1	6	21	7
CORONADO					
43-7601B	General Instrument 205	1	15	10	11
43-7651	General Instrument 205	1	15	9	7
43-7851	V-M 800	1	37	47	5
43-9196	Utah 650	1	33	14	35
43-9201	Utah 550	1	32	24	14
94RA1-43-7605A	V-M 800	1	37	65	5
94RA1-43-7656A	Webster 148	2	77	73	2
94RA1-43-7657A	Webster 148	2	77	73	2
94RA1-43-7751A	Milwaukee 11600	3	100	87	3
CRESCENT					
H-16A1	Crescent 6 Series	3	94	76	8
CROSLEY					
9-2-2M	Webster 148	2	77	52	5
9-204	Webster 148	2	77	63	5
9-205M	Webster 148	2	77	63	5
9-207M	Webster 56	1	39	57	6
9-209	Misc. Series 700F	2	86	53	10
9-912M	Misc. Series 700F	2	86	53	10
9-213B	Misc. Series 700F	2	86	53	10
9-214N	Misc. Series 700F	2	86	65	6
9-214ML	Misc. Series 700FLP	2	89	65	6
9-404M	Webster 246	2	78	79	4
9-414B	Webster 246	2	78	79	4
9-409M3	Misc. Series 700F-33/45	3	119	94	3
56TQ	V-M 400	1	36	33	2
56TR	General Instrument 205	1	15	17	11
56TS	General Instrument 205	1	15	17	11
56TZ	V-M 400	1	36	33	2
66CS	Seeburg K	1	25	18	14
66CSM	Seeburg K	1	25	18	14
68CP	Oak 6666	1	20	37	5
68CR	Oak 6666	1	20	37	5
86CR	Seeburg K	1	25	12	10
86CS	Seeburg K	1	25	12	10
87CQ	Seeburg K	1	25	36	5
106CP	Seeburg K	1	25	7	6
106CS	Seeburg K	1	25	7	6
146CS	V-M 400	1	36	25	10
148CP	V-M 400 (Late)	2	72	42	6
148CQ	Webster 56	1	39	42	6
DALBAR					
M8	Webster 56	1	39	8	34
DEARBORN					
100	V-M 200B	1	35	10	15
DELCO					
R-1241	V-M 800	1	37	62	11
R-1244	V-M 800	1	37	52	6
R-1245	V-M 800	1	37	52	6
R-1246	V-M 800	1	37	52	6
R-1248	Seeburg L	1	26	66	7
R-1249	Seeburg L	1	26	66	7
R-1250	Seeburg L	1	26	66	7
R-1251	Seeburg L	1	26	21	10
R-1252	Seeburg L	1	26	21	10
R-1253	Oak 6666	1	20	47	7
R-1254	Oak 6666	1	20	47	7
R-1255	Oak 6666	1	20	47	7

Trade Name and Model	Changer Name and Model	Changer Vol.	Manual Sec.	Photofact Set	Photofact Folder
DETROLA					
558-1-49A	Utah 650	1	33	7	8
582	Utah 550	1	32	19	14
626	Utah 550	1	32	11	5
7156	Utah 650	1	33	48	6
7270	Utah 650	1	33	16	8
DEWALD					
A-605	General Instrument 205	1	15	16	10
DU MONT					
Ra-103	Webster 256	2	79	90	3
DYNAVOX					
AP-514	Milwaukee-Erwood 10700	1	18	28	9
ECA					
106	General Instrument 205	1	15	7	10
121	Utah 650	1	33	13	15
131	General Instrument 205	1	15	16	12
Wire Rec.	Crescent 1000 Series	2	52	-	-
ECHOPHONE					
EC-306	General Instrument 205	1	15	14	8
EC-403	Seeburg L	1	26	22	4
EX-306	General Instrument 205	1	15	14	8
ELECTROMATIC					
606A	Utah 550	1	32	5	32
607A	Utah 550	1	32	5	32
APH-301A	Utah 550	1	32	7	11
APH-301C	Utah 550	1	32	7	11
ELECTRO-TONE					
555	Seeburg K	1	25	13	16
E/L (ELECTRONIC LABS.)					
710PB	Webster 56	1	39	24	16
710PC	Webster 56	1	39	24	16
EMERSON					
506	General Instrument 205	1	15	6	9
525	General Instrument 205	1	15	20	8
529	General Industries R70	1	12	18	15
537	Webster 56	1	39	23	7
546	General Instrument 205	1	15	21	15
548	General Instrument 205	1	15	30	8
549	Oak 6666	1	20	26	12
552	General Instrument 205	1	15	20	8
563	General Instrument 204	1	14	73	4
573B	Misc. Series 700F	2	86	42	11
576A	General Instrument 205	1	15	40	5
579A	Misc. Series 700F	2	86	61	6
585	Misc. Series 700FS	2	87	61	7
586	Webster 146	2	77	72	9
590	Crescent 6 Series	3	94	87	5
593	General Instrument 204	1	14	73	4
596	Misc. Series 700F	2	86	61	6
603	General Instrument 204	1	14	73	4
605	Webster 146	2	77	66	8
623	Crescent 6 Series	3	94	87	5
635	Crescent 6 Series	3	94	92	1
ESPEY					
641	Seeburg K	1	25	8	11
642	Seeburg K	1	25	8	11
6540	Seeburg K	1	25	8	12
6541	Seeburg K	1	25	8	12
6545	Utah 550	1	32	5	16
6547	Seeburg K	1	25	8	12
FADA					
602	General Instrument 205	1	15	14	12
637	General Instrument 205	1	15	17	14
FARNSWORTH					
EK-081	Farnsworth P-51	1	11	26	13
EK-082	Farnsworth P-51	1	11	26	13
EK-083	Farnsworth P-51	1	11	26	13
EK-262	Farnsworth P-51	1	11	7	15
EK-263BL	Farnsworth P-51	1	11	7	15
EK-263WL	Farnsworth P-51	1	11	7	15
EK-264BL	Farnsworth P-51	1	11	7	15
EK-264WL	Farnsworth P-51	1	11	7	15
EK-265	Farnsworth P-51	1	11	7	15
EK-681	Farnsworth P-51	1	11	26	13
GK-100	Farnsworth P-51	1	11	23	8
GK-102	Farnsworth P-51	1	11	23	8
GK-103	Farnsworth P-51	1	11	23	8
GK-104	Farnsworth P-51	1	11	23	8
GK-111	Farnsworth P56MP	1	11	60	11
GK-112	Farnsworth P56MP	1	11	60	11
GK-114	Farnsworth P56MP	1	11	60	11
GK-115	Farnsworth P56MP	1	11	60	11
GK-140	Farnsworth P-51	1	11	24	18
GK-141	Farnsworth P-51	1	11	24	18
GK-142	Farnsworth P-51	1	11	24	18
FARNSWORTH (Continued)					
GK-143	Farnsworth P-51	1	11	24	18
GK-144	Farnsworth P-51	1	11	24	18
FERRAR					
WR-11	General Instrument 205	1	15	15	10
FIRESTONE (Air Chief)					
4-A-15	Farnsworth P-51	1	11	36	7
4-A-17	Utah 550	1	32	35	7
4-A-31	Farnsworth P-51	1	11	11	20
4-A-37	Farnsworth P-51	1	11	13	7
4-A-42	Farnsworth P-51	1	11	30	9
4-A-60	Webster 56	1	39	38	6
4-A-62	Webster 148	2	77	67	10
4-A-63	Webster 148	2	77	67	10
4-A-64	V-M 400	1	36	68	9
4-A-65	V-M 400	1	36	68	9
4-A-66	V-M 402	2	73	74	4
4-A-71	Misc. Series 700R	2	88	59	9
FREED-EISEMANN					
46	Webster 56	1	39	11	8
GAMBLE SKOGMO (See Coronado)					
GAROD					
6DPS	Seeburg K	1	25	12	13
6DPS-A	Seeburg K	1	25	12	13
11FMP	Seeburg K	1	25	38	7
306	Crescent C200	1	10	48	8
GENERAL ELECTRIC					
41	Webster 70	1	40	32	8
42	Webster 70	1	40	32	8
43	Webster 70	1	40	32	8
44	Webster 70	1	40	32	8
45	Webster 70	1	40	32	8
118	General Electric P-6	2	54	39	5
119M	General Electric P-6	2	54	39	5
119W	General Electric P-6	2	54	39	5
303	General Instrument 205	1	15	18	19
304	General Instrument 205	1	15	32	10
324	General Electric P-6	2	54	64	7
326	Webster 56	1	39	30	11
327	Webster 56	1	39	30	11
328	General Electric P-6	2	54	64	7
354	General Instrument 205	1	15	33	9
355	General Instrument 205	1	15	33	9
376	Seeburg K	1	25	45	11
377	Seeburg K	1	25	45	11
378	Seeburg K	1	25	45	11
417	General Instrument 205	1	15	16	15
502	Webster 56	1	39	35	9
840	Webster 70	1	40	81	9
GILFILLAN					
66P	General Instrument 204	1	14	9	15
66PM	General Instrument 204	1	14	9	15
68-48	Crescent 1000 Series	2	51	61	10
108-48	Webster 56	1	39	59	10
108-48	Webster 79	1	41	59	10
GLOBE					
7CP-1	Oak 6666	1	20	28	14
62C	Oak 6666	1	20	19	19
GRANTLINE					
641	Seeburg K	1	25	12	15
6547	Seeburg K	1	25	11	10
HOFFMAN					
A-401	Webster 50	1	38	11	12
A-500	Seeburg K	1	25	4	34
A-501	Webster 56	1	39	3	35
B-400	Aero Metal 46A	1	6	17	17
B-1000	Webster 50	1	38	20	14
C-501	Webster 70	1	40	48	11
C-502	Webster 56	1	39	51	9
C-503	General Industries RC130L	1	13	50	9
C-504	General Industries RC130L	1	13	47	10
C-506	Webster 56	1	39	49	10
C-507	Webster 148	2	77	49	10
C-511	Webster 70	1	40	48	11
C-512	Webster 56	1	39	51	9
C-513	General Industries RC130L	1	13	50	9
C-514	General Industries RC130L	1	13	47	10
C-518	Webster 56	1	39	61	13
C-1006	Webster 56	1	39	54	9
C-1006	Webster 79	1	41	54	9
C-1007	Webster 56	1	39	54	9
C-1007	Webster 79	1	41	54	9
HOWARD					
472AC	V-M 800	1	37	31	14
472AF	V-M 800	1	37	31	14
472C	V-M 800	1	37	31	14

Trade Name and Model	Changer Name and Model	Changer Vol.	Manual Sec.	Photofact Set	Photofact Folder
HOWARD (Continued)					
472F	V-M 800	1	37	31	14
901AP	Webster 50	1	38	10	21
906C	V-M 400	1	36	17	18
909M	Webster 50	1	38	25	15
KNIGHT (Allied Radio)					
5B-185	Milwaukee-Erwood 10700	1	18	22	17
6D-360	Milwaukee-Erwood 10700	1	18	39	10
7D-405	Misc. Series 700R	2	88	39	11
8B-210	General Instrument 205	1	15	20	17
11C-300	Seeburg K	1	25	29	12
11D-302	Seeburg S	2	67	57	9
LAFAYETTE (Radio Wire Television)					
J62	Oak 6666	1	20	16	21
J62C	Oak 6666	1	20	16	21
MC13	Crescent 200 Series	1	10	15	16
LEARADIO					
1281-PC	Webster 56	1	39	49	11
6610-PC	Lear PC206A	1	16	9	21
6611-PC	Lear PC206A	1	16	9	21
6612-PC	Lear PC206A	1	16	9	21
6617-PC	Lear PC206A	1	16	16	22
LEE TONE					
AP-100	Maguire ARC-1	1	17	16	23
LEWYT					
615A	Webster 56	1	39	11	13
LEXINGTON					
6545	Utah 550	1	32	13	20
MAGNAVOX					
CR-210	Webster 146	2	78	52	11
CR-211B	Webster 256	2	79	68	10
MAGUIRE					
700A	Maguire ARC-1	1	17	7	18
700E	Maguire ARC-1	1	17	15	17
MAJESTIC					
5A445	Milwaukee-Erwood 10700	1	18	23	12
5A445R	Milwaukee-Erwood 10700	1	18	23	12
5AK731	Aero Metal 46A	1	6	28	19
5AK780	Aero Metal 46A	1	6	28	19
6FM773	Aero Metal 46A	1	6	57	10
7C447	Milwaukee-Erwood 10700	1	18	14	17
7FM877	Aero Metal 47A	2	45	56	14
7FM888	Aero Metal 47A	2	45	56	14
7JK777R	Aero Metal 46A	1	6	27	18
7JL866	Aero Metal 47A	2	45	60	14
7S433	Milwaukee-Erwood 10700	1	18	22	19
7S450	Milwaukee-Erwood 10700	1	18	22	19
7S470	Milwaukee-Erwood 10700	1	18	22	19
7YR752	St. George 1100	1	29	29	13
7YR753	St. George 1100	1	29	42	17
7YR772	St. George 1100	1	29	42	17
8FM775	Oak 6666	1	20	29	14
8FM776	Oak 6666	1	20	29	14
8FM889	Oak 6666	1	20	54	12
8JL885	Aero Metal 47A	2	45	47	11
8S452	Oak 6666	1	20	8	19
8S473	Oak 6666	1	20	8	19
10FM981	Oak 6666	1	20	65	8
12FM475	V-M 400	1	36	28	20
12FM778	V-M 400	1	36	28	20
12FM779	V-M 400	1	36	28	20
12FM895	V-M 402	2	73	59	11
MANTOLA					
R630-RP	Crescent 200 Series	1	10	3	22
R655-W	Crescent 200 Series	1	10	8	20
R75152	Utah 7000	1	34	38	10
R76162	Utah 7000	1	34	40	10
R76262	Utah 7000	1	34	51	12
R78162	Utah 7000	1	34	43	11
MARK SIMPSON (See Masco)					
MASCO					
MA35RC	Oak 6666	1	20	21	20
MC-25N	Oak 6666	1	20	57	11
MC-25PC	Oak 6666	1	20	57	11
MC-25PN	Oak 6666	1	20	57	11
MC-25RC	Oak 6666	1	20	57	11
MCR-5	Oak 6666	1	20	15	18
RK-5	General Industries R90	1	12	33	11
MECK					
CD-500	Crescent 250 Series	2	50	33	12
MEISSNER					
9-1065	General Industries R90	1	12	3	15
2961	Seeburg M	1	27	27	19

Trade Name and Model	Changer Name and Model	Changer Vol.	Manual Sec.	Photofact Set	Photofact Folder
MIDWEST					
R-12	V-M 800	1	37	44	12
R-16	V-M 400 Late	2	72	45	16
RG-12	V-M 800	1	37	44	12
RG-16	V-M 400 Late	2	72	45	16
RT-12	V-M 800	1	37	44	12
RT-16	V-M 400 Late	2	72	45	16
SG-12	Crescent 200 Series	1	10	21	23
ST-12	Crescent 200 Series	1	10	21	23
ST-16	Crescent 200 Series	1	10	21	24
S-12	Crescent 200 Series	1	10	21	23
S-16	Crescent 200 Series	1	10	21	24
MOLDED INSULATION (Wire Tone)					
MR-6	St. George 1100	1	29	41	15
MONITOR					
M-3070	Universal Camera 100	1	31	29	15
RA-50	Universal Camera 100	1	31	24	23
MOTOROLA					
VF-103	Webster 246	2	78	73	8
WR-6	Motorola B24RC, B25RC, B27RC, B28RC	1	19	5	2
12VF4	Milwaukee 11600	3	100	92	4
55F11	Motorola B24RC, B25RC, B27RC, B28RC	1	19	4	14
59F11	Crescent 6 Series	3	94	68	12
65F11	Motorola B24RC, B25RC, B27RC, B28RC	1	19	6	19
65F21	Motorola B24RC, B25RC, B27RC, B28RC	1	19	4	12
67F11	Motorola RC-30	2	60	31	20
67F12	Motorola RC-30	2	60	31	20
67F12B	Motorola RC-30	2	60	31	20
67F14	Motorola RC-30	2	60	55	15
68F11	Motorola RC-30	2	60	58	13
68F12	Motorola RC-30	2	60	58	13
68F14	Motorola RC-30	2	60	58	13
68F14B	Motorola RC-30	2	60	58	13
68F14M	Motorola RC-30	2	60	58	13
75F21	Motorola B24RC, B25RC, B27RC, B28RC	1	19	19	21
75F31	Motorola B24RC, B25RC, B27RC, B28RC	1	19	29	18
75F31A	Motorola B24RC, B25RC, B27RC, B28RC	1	19	29	18
75F31B	Motorola B24RC, B25RC, B27RC, B28RC	1	19	29	18
76F31	Motorola B24RC, B25RC, B27RC, B28RC	1	19	29	18
77FM21	Motorola B24RC, B25RC, B27RC, B28RC	1	19	33	13
77FM22	Motorola B24RC, B25RC, B27RC, B28RC	1	19	33	13
77FM22WM	Motorola B24RC, B25RC, B27RC, B28RC	1	19	33	13
77FM23	Motorola B24RC, B25RC, B27RC, B28RC	1	19	33	13
78F11	Motorola RC-30	2	60	56	17
78F11M	Motorola RC-30	2	60	56	17
78F12M	Motorola RC-30	2	60	56	17
79FM21	Milwaukee 11600	3	100	88	7
79FM21B	Milwaukee 11600	3	100	88	7
79FM21R	Milwaukee 11600	3	100	88	7
85F21	Motorola B24RC, B25RC, B27RC, B28RC	1	19	6	20
88FM21	Milwaukee-Erwood 11200	2	59	54	15
95F31	Motorola B24RC, B25RC, B27RC, B28RC	1	19	19	22
95F31B	Motorola B24RC, B25RC, B27RC, B28RC	1	19	19	22
95F33	Motorola B24RC, B25RC, B27RC, B28RC	1	19	19	22
99FM21R	Milwaukee 11600	3	100	80	10
107F31	Seeburg L	1	26	33	14
107F31B	Seeburg L	1	26	33	14
MUSITRON					
SRC-3	Crescent 200 Series	1	10	13	21
OLYMPIC					
6-617	Seeburg K	1	25	4	7
7-622	Misc. Series 700R	2	88	34	14
7-638	Misc. Series 700R	2	88	34	14
7-724	Seeburg L	1	26	29	19
7-925	Webster 56	1	39	31	22
7-934	Webster 56	1	39	31	22
7-936	Webster 56	1	39	31	22
7-939	Webster 56	1	39	31	22
8-618	Seeburg K	1	25	35	16
8-925	Seeburg K	1	25	45	19
8-934	Seeburg K	1	25	45	19
8-936	Seeburg K	1	25	45	19
PACKARD-BELL					
661	Utah 550	1	32	8	25

Trade Name and Model	Changer Name and Model	Changer Vol.	Manual Sec.	Photofact Set	Photofact Folder
PACKARD-BELL (Continued)					
662	Utah 650	1	33	13	22
673A, B	Webster 56	1	39	46	18
861	General Industries RC130L	1	13	17	23
880, A	Webster 56	1	39	46	18
881A, B	General Industries RC130L	1	13	17	23
884	Webster 148	2	77	74	6
892	Webster 148	2	77	74	6
1054B	General Industries RC130L	1	13	13	23
1063	General Industries RC130L	1	13	18	25
1181, A	General Industries RC130L	1	13	75	12
1273	General Industries RC130L	1	13	46	19
1472	General Industries RC130L	1	13	48	17
PHILCO					
46-1201	Philco M-7	1	23	4	35
46-1203	Philco D-10	1	21	6	23
46-1209	Philco D-10A	1	21	13	24
46-1213	Philco M-4	1	22	12	33
46-1226	Philco D-10	1	21	15	24
47-1227	Philco D-10	1	21	25	22
47-1230	Philco D-10A	1	21	22	23
48-1200	Philco M-7	1	23	29	20
48-1201	Philco M-7	1	23	31	25
48-1253	Philco M-8	2	61	36	17
48-1256	Philco D-10	1	21	34	18
48-1260	Philco M-7	1	23	31	25
48-1262	Philco D-10	1	21	35	18
48-1263	Philco D-10	1	21	32	18
48-1264	Philco D-10	1	21	36	18
48-1266	Philco D-10	1	21	39	15
48-1270	Philco M-4	1	22	42	20
48-1274	Philco M-4	1	22	41	17
48-1276	Philco M-4	1	22	41	17
48-1282	Philco D-10	1	21	35	18
48-1284	Philco M-8	2	61	45	20
48-1286	Philco D-10	1	21	51	15
48-1290	Philco D-10A	1	21	47	18
49-1175	Philco M-9C	2	62	70	6
49-1401	Philco M-7	1	23	45	21
49-1405	Philco M-9C	2	62	54	24
49-1475	Philco M-9C	2	62	77	8
49-1480	Philco M-9C	2	62	77	8
49-1600	Philco M-9	2	61	50	13
49-1602	Philco M-9	2	61	55	18
49-1603	Philco M-9	2	61	55	18
49-1604	Philco M-9	2	61	55	18
49-1605	Philco M-9C	2	62	55	18
49-1606	Philco M-9	2	61	55	18
49-1607	Philco M-9C	2	62	53	19
49-1609	Philco M-9C	2	62	53	19
49-1613	Philco M-9C	2	62	91	9
49-1615	Philco M-12C	3	102	64	9
50-1720	Philco M-12C	3	102	93	8
50-1725	Philco M-12C	3	102	93	8
50-1727	Philco M-20	3	103	86	7
PHILHARMONIC					
100C	Crescent 200 Series	1	10	38	16
100T	Universal Camera 100	1	31	33	20
149C	Crescent 350	2	50	55	19
249C	Crescent 350	2	50	55	19
349C	Crescent 350	2	50	58	17
6810	Seeburg K	1	25	18	27
8701	Seeburg K	1	25	18	27
8702	Seeburg K	1	25	18	27
8703	Seeburg K	1	25	18	27
8710	Seeburg K	1	25	18	27
8711	Seeburg K	1	25	18	27
8712	Seeburg K	1	25	18	27
PHILLIPS					
3-81A	V-M 400	1	36	48	20
PURITAN					
503	General Instrument 205	1	15	10	25
RCA					
8TV321	RCA RP178	2	64	74	8
8V90	RCA RP178	2	64	56	20
8V91	RCA RP178	2	64	56	20
8V111	RCA RP178	2	64	58	18
8V112	RCA RP178	2	64	58	18
8V151	RCA RP177	2	63	61	17
9TW333	RCA RP178	2	64	74	8
9V7	RCA RP168	3	104		
9W101	RCA RP168	3	104	73	10
9W103	RCA RP168	3	104	73	10
9W105	RCA RP168	3	104	73	10
9W105	RCA RP178	2	64	73	10
9Y7	RCA RP168	3	104	75	13
55AU	Crescent 200 Series	1	10	2	16
55U	Crescent 200 Series	1	10	2	16
58AV	Seeburg L	1	26	1	32
58V	Seeburg L	1	26	1	32
59AV1	Seeburg L	1	26	6	25
59V1	Seeburg L	1	26	6	25

Trade Name and Model	Changer Name and Model	Changer Vol.	Manual Sec.	Photofact Set	Photofact Folder
RCA (Continued)					
65AU	Crescent 200 Series	1	10	14	23
65U	Crescent 200 Series	1	10	14	23
67AV1	Crescent 200 Series	1	10	9	27
67V1	Crescent 200 Series	1	10	9	27
77U	RCA RP178	2	64	38	17
77V1	Crescent 200 Series	1	10	38	18
77V2	Crescent 200 Series	1	10	39	19
610V1	Seeburg L	1	26	31	27
610V2	Seeburg L	1	26	31	27
612V1	RCA RP176	1	24	17	27
612V2	RCA RP176	1	24	17	27
612V3	RCA RP176	1	24	17	27
648PV	RCA RP176	1	24	90	9
710V2	RCA RP177	2	63	40	15
711V2	Seeburg L	1	26	22	24
730TV1	RCA RP177	2	63	70	7
730TV2	RCA RP177	2	63	70	7
8TV321	RCA RP178	2	64	74	8
RADIOLA					
75ZU	RCA RP178	2	68	36	19
RADIONIC					
Y62W	General Instrument 205	1	15	26	22
Y728	General Instrument 205	1	15	26	22
RAYTHEON					
10AXF43	Crescent 6 Series	3	94	75	14
RADIO WIRE TELEVISION (See Lafayette)					
RECORDIO (Wilcox-Gay)					
7D44	General Industries RC130L	1	13	52	18
7E40	General Industries RC130L	1	13	47	20
7E44	General Industries RC130L	1	13	47	20
9G40M	General Industries RC130L	1	13	86	9
9G42	General Industries RC130L	1	13	86	9
9H40B	V-M 406	3	108	89	13
REMLER					
5310	Webster 56	1	39	40	17
SEARS, ROEBUCK (See Silvertone)					
SENTINEL					
IU-293-CT	General Instrument 205	1	15	29	22
292K	General Instrument 205	1	15	16	30
293CT	General Instrument 205	1	15	29	22
296B	Webster 56	1	39	46	22
296M	Webster 56	1	39	46	22
SILVERTONE					
6100	Utah 550	1	32	6	29
6105	Utah 550	1	32	7	26
6111	General Instrument 204	1	14	7	26
7080, A	General Instrument 205	1	15	58	20
7085	Silvertone 101.771 (771)	1	28	30	27
7086	Silvertone 101.771 (771)	1	28	27	25
7100	General Instrument 205	1	15	17	29
7102	Silvertone 101.771 (771)	1	28	30	27
7103	Silvertone 101.771 (771)	1	28	27	25
7111	Seeburg K	1	25	30	28
7115	General Instrument 205	1	15	16	33
7116	General Instrument 205	1	15	16	33
7117	Utah 650	1	33	16	33
7152	Utah 550	1	32	25	26
7153	Utah 650	1	33	26	30
8080	Utah 7000	1	34	52	20
8083, A	V-M 800	1	37	58	20
8084, A	V-M 800	1	37	58	20
8086, A	Silvertone 101.771 (771)	1	28	61	18
8101, A, B, C	V-M 800	1	37	58	20
8103	Silvertone 101.771 (771)	1	28	56	21
8105	V-M 400 Late	2	72	35	20
8105	V-M 400	1	36	35	20
8108, A	Silvertone 101.761-3, 101.762-3	2	68	64	10
8115, B	Silvertone 101.761-3, 101.762-3	2	68	62	18
8127	Silvertone 101.771 (771)	1	28	41	20
8127	Silvertone 101.761-3, 101.762-3	2	68	41	20
8128	Silvertone 101.771 (771)	1	28	41	20
8128	Silvertone 101.761-3, 101.762-3	2	68	41	20
8145	Utah 7001	2	71	45	23
8149	Utah 7000	1	34	48	23
8153	Utah 7000	1	34	42	22
8153, A	Utah 7000	1	34	42	22
8160, A	Utah 7000	1	34	50	17
9105	V-M 800	1	37	89	14
9153	V-M 800	1	37	67	16
SIMPLON					
CA-5	Crescent 200 Series	1	10	22	27
6106A	General Instrument 204	1	14		
6111A	General Instrument 204	1	14		
7111	Seeburg K	1	25		

Trade Name and Model	Changer Name and Model	Changer Vol.	Manual Sec.	Photofact Set	Photofact Folder
SONORA					
RKRU-215	General Instrument 205	1	15	9	31
RMR-219	Oak 6666	1	20	19	28
WBRU-239	Crescent 250 Series	2	50	32	23
WKRU-254A	Crescent 250 Series	2	50	34	20
WLRU-219A	Oak 6666	1	20	37	21
401	Crescent 350 Series	2	51	42	21
SPARKS WITHINGTON (See Sparton)					
SPARTON					
6AW26PA	Seeburg K	1	25	15	33
10BW76PA	Seeburg K	1	25	15	34
121	V-M 800	1	37	57	19
1000	Seeburg L	1	26	60	18
1001	Seeburg L	1	26	60	18
1003	Seeburg L	1	26	60	18
1005	Seeburg L	1	26	29	25
1006	Seeburg L	1	26	29	25
1007	Seeburg L	1	26	29	25
1008	Seeburg L	1	26	29	25
1010	V-M 800	1	37	35	22
1020	Seeburg L	1	26	60	18
1021	Seeburg L	1	26	60	18
1023	Seeburg L	1	26	60	18
1030, A	V-M 800	1	37	37	22
1035, A	V-M 800	1	37	62	19
1036, A	V-M 800	1	37	62	19
1037, A	V-M 800	1	37	62	19
1039	V-M 800	1	37	62	19
1040	V-M 800	1	37	62	19
1041	V-M 800	1	37	62	19
1051	V-M 800	1	37	58	21
1052	V-M 800	1	37	58	21
1058	V-M 800	1	37	57	19
1059	V-M 800	1	37	57	19
1060	V-M 800	1	37	57	19
1061	V-M 800	1	37	57	19
1064	V-M 800	1	37	57	19
1072	V-M 800	1	37	57	19
4900TV	V-M 402D	2	74	64	11
STEWART-WARNER					
A61CR1	Aero Metal 47A	2	45	39	25
A61CR2	V-M 400	1	36	39	25
A61CR3	Aero Metal 47A	2	45	39	25
A61CR4	V-M 400	1	36	39	25
A92CR3S	V-M 400	1	36	29	26
A92CR6	V-M 400	1	36	29	26
A92CR6S	V-M 400	1	36	29	26
B72CR1	Aero Metal 47A	2	45	47	22
B92CR1	Aero Metal 47A	2	45	65	14
B92CR2	V-M 400	1	36	65	14
B92CR3	V-M 400	1	36	65	14
B92CR4	V-M 400	1	36	65	14
B92CR8	V-M 400	1	36	65	14
B92CR9	V-M 400	1	36	65	14
B92CR10	V-M 400	1	36	65	14
72CR16	General Instrument 204	1	14	18	28
72CR26	General Instrument 204	1	14	18	28
STROMBERG-CARLSON					
1101HPW	V-M 400	1	36	41	23
1135PFM	Seeburg M	1	27	23	26
1135PLM	Seeburg M	1	27	23	26
1135PLW	Seeburg M	1	27	23	26
1202	V-M 400 Late	2	72	55	21
1210M2-M	Seeburg L	1	26	37	23
1210M2-W	Seeburg L	1	26	37	23
1210M2-Y	Seeburg L	1	26	37	23
1210PGM	Seeburg L	1	26	37	23
1210PGW	Seeburg L	1	26	37	23
1210PLM	Seeburg L	1	26	37	23
1220 Series	V-M 800	1	37	50	19
1235PLM	Seeburg K	1	25		
1407PFM	V-M 402	2	73	58	23
1407PLM	V-M 402	2	73	58	23
1409PGM	V-M 400	1	36	62	20
TELEQUIP					
5140A	Utah 550	1	32	11	24
TELE-TONE					
133	General Instrument 205	1	15	11	25
134	General Instrument 205	1	15	13	32
183	Misc. Series 700R	2	88	53	24
TELEVOX					
RP	Crescent 200 Series	1	10	22	29
TEMPLE					
F-617	Utah 550	1	32	12	27
G-518	V-M 800	1	37	29	27
G-622	Crescent 250 Series	2	49	44	24
G-722	V-M 400	1	36	24	27
G-725	V-M 400	1	36	34	23
G-1430	V-M 400	1	36	43	19

Trade Name and Model	Changer Name and Model	Changer Vol.	Manual Sec.	Photofact Set	Photofact Folder
TEMPLE (Continued)					
H-622	Crescent 250 Series	2	49	44	24
H-727	Crescent 250 Series	2	49	34	23
T-617	Utah 550	1	32		
TEMPLETONE (See Temple)					
TRAV-LER					
6040	Aviola 100	1	7	49	25
6050	Aviola 100	1	7	56	23
TRUETONE					
D-1644	Utah 550	1	32	12	30
D-1645	Oak 6666	1	20	6	33
D-1747	Utah 550	1	32	32	27
D-1748	Utah 550	1	32	32	27
D-1752	Utah 650	1	33	34	25
D-1840	Oak 6666	1	20	46	24
D-1845	Oak 6666	1	20	31	31
D-1846A, B, C	Oak 6666	1	20	40	23
D-1850	Oak 6666	1	20	51	23
D-1949	Oak 6666	1	20	60	20
D-2604	Crescent 200 Series	1	10	13	34
D-2642	Crescent 200 Series	1	10	12	32
D-2645	General Instrument 205	1	15	4	39
D-2748	Utah 550	1	32	26	27
D-2851	Utah 550	1	32	38	28
U. S. TELEVISION					
5C66	Seeburg K	1	25	17	9
8-16M	Seeburg K	1	25	26	29
V-M					
1001-A	V-M 200B	1	35	10	34
VIEWTONE					
RC-201A	Maguire ARC-1	1	17	11	32
RRC-201	Maguire ARC-1	1	17	11	32
WATTERSON					
ARC-4591	Webster 56	1	39	16	36
WEBSTER-CHICAGO					
161-1	Webster 56	1	39	55	26
WESTINGHOUSE					
H-107	General Instrument 205	1	15	4	19
H-108	General Instrument 205	1	15	4	19
H-110	General Instrument 205	1	15	4	19
H-111	General Instrument 205	1	15	4	19
H-117	General Instrument 204	1	14	11	34
H-119	Webster 56	1	39	11	34
H-122	General Instrument 205	1	15	6	35
H-130	General Instrument 205	1	15	6	35
H-153, A	General Instrument 205	1	15	35	25
H-155	General Instrument 205	1	15	35	25
H-164	V-M 400	1	36	36	28
H-166	V-M 400	1	36	36	28
H-167	V-M 400	1	36	36	28
H-168, A	V-M 800	1	37	34	37
H-169	V-M 400	1	36	37	24
H-171	General Instrument 205	1	15	35	25
H-183A	Westinghouse V-5635	2	88	48	26
H-186M	V-M 400 Late	2	73	60	21
H-187	V-M 400 Late	2	73	60	21
H-190	Webster 148	2	77	59	23
H-191	Westinghouse V-4914	2	80	59	23
H-203	Westinghouse V-4944	2	81	62	21
H-212	Westinghouse V-4944	2	81	62	21
WILCOX-GAY (See Recordio)					
WOOLAROC					
3-20A	V-M 400	1	36	24	33
3-29A	General Instrument 205	1	15	7	31
3-70A	V-M 400	1	36	31	34
3-71A	V-M 400	1	36	36	29
ZENITH					
5R080	Zenith S-11468	1	42	4	4
5R086	Zenith S-11468	1	42	4	4
6R084	Zenith S-11468	1	42	20	36
6R086	Zenith S-11468	1	42		
6R087	Zenith S-11468	1	42	7	32
6R886	Zenith S-11468	1	42	34	30
7R070	Zenith S-11468	1	42	37	25
7R887	Zenith S-14004	2	85	54	22
9H079	Zenith S-11680	1	43	7	34
9H079E	Zenith S-11680	1	43	7	34
9H079R	Zenith S-11680	1	43	7	34
9H081	Zenith S-11680	1	43	7	24
9H082R	Zenith S-11680	1	43	7	34
9H085R	Zenith S-11680	1	43	7	34
9H088R	Zenith S-11680	1	43	7	34
9H881	Zenith S-11680	1	43	43	25
9H882R	Zenith S-11680	1	43	43	25
9H885	Zenith S-11680	1	43	43	25

Trade Name and Model	Changer Name and Model	Changer Vol.	Manual Sec.	Photofact Set	Photofact Folder
ZENITH (Continued)					
9H88R	Zenith S-11680	1	43	43	25
9H984	Zenith S-14012	3	116	64	14
9H984LP	Zenith S-14012	3	116	64	14
9H995	Zenith S-14004	2	85	74	12
12H090	Zenith S-11680	1	43	2	20
12H091	Zenith S-11680	1	43	2	20
12H092	Zenith S-11680	1	43	2	20
12H093	Zenith S-11680	1	43	2	20
12H094	Zenith S-11680	1	43	2	20
14H789	Zenith S-14002	2	84	41	24
28T964R	Zenith S-13675	2	84	74	13
42T999RLP	Zenith S-13675	2	84	74	13

CORONA AND ARCING

Issue No. 5 - Westinghouse Service Hints, under the heading "General Information," contains an excellent article on Corona and Arcing, reproduced herewith with full credit to Westinghouse.

"Where high voltage sources are required, as in a television receiver, it is necessary to guard against possible corona or arcing. The following discussion should serve to assist in the isolation and suppression of corona conditions upon their occurrence.

"In locations where the humidity is high, corona conditions become aggravated due to the lowered dielectric constant of the air surrounding the high voltage source. When the air contains a high percentage of moisture, ionization takes place and corona forms at points of small surface area which are subject to a high potential much more readily than under less humid conditions. Corrective measures involve increasing the surface area at the points where corona exists. Corona can also emanate from particles of grit or dust adhering to high voltage conductors and components which provide points of high potential and small surface area and may form a path for arcing.

"Arcing occurs only when the insulation resistance between two points of high potential becomes lower than the critical insulation resistance necessary for the potential involved. Arcing, therefore, is corrected by increasing the insulation resistance between the two offending points, either by spacing or introducing a high dielectric material such as polyethelene sheet.

"CORONA: A blue or violet discharge emanating from H. V. sources, characterized by a hissing sound.

"ARCING: Periodic or sustained breakdown between two points of different potential, characterized by a snapping and popping sound.

"LOCATING CORONA: A darkened room will often prove to be of value when looking for corona, depending upon the magnitude of the corona discharge. In cases where the discharge is difficult to locate visually, it is often possible to detect the corona source by carefully probing points in question with a blunt rod of non-conducting material. When the blunt instrument contacts the corona source the hissing sound will change pitch or be interrupted. The magnitude of the corona discharge may be increased to facilitate location by using a Variac to increase the line voltage. Corona may occur at sharp solder points, around excessive rosin, sharp bends in wiring, etc.

"LOCATING ARC: An arc can usually be located by visual inspection of the high voltage sources. A darkened room may be useful where the arc is very small. Increasing the arc by using a Variac to raise the line voltage may also be of assistance.

"CORRECTING CORONA:

"1. Eliminate all sharp points, such as the junction of two components, by soldering connections heavily and forming smooth rounded joints free from sharp burrs and excessive rosin.

"2. If corona is emanating from insulating material, apply a coat of insulating varnish such as Westinghouse BT-2143 Tuffernell or equivalent. (It is imperative to use a varnish which will not form bubbles while drying.) Where necessary, several coats should be applied.

"3. Clear all H. V. areas of accumulated dust, grit, and residue. To wipe residue from connections and insulating surfaces, a cloth moistened with carbon tetrachloride is recommended.

"4. When corona appears at the termination of a wire, it may be suppressed by wrapping the wire-end with Scotch Acetate Woven Tape.

"5. Corona about an H. V. capacitor may be due to metallic paint on the capacitor. The paint should be removed with lacquer thinner or paint remover.

"6. Corona at tube pins and socket contacts (1V2, 1X2, 1X2A) can be corrected by filling tube socket contacts with 'Lubriplate' and re-inserting tube.

"CORRECTING ARCING: Arcing can usually be corrected by proper lead dress and spacing of H. V. leads and removal of dust and residue from insulators and components.

"Materials used in correcting Corona and Arcing:

Material	Supplier
1. Scotch Acetate Woven Tape	Minnesota Mining & Mfg. Co., 401 Broad St., Philadelphia, Penn.
(Obtainable at most stationery stores)	
2. Permacel Industrial Tape	Industrial Tape Corporation, New Brunswick, N. J.
(Obtainable at most stationery stores)	
3. Sheet Polyethylene V-8567 (18" x 20")	Westinghouse Electric Corp., Television-Radio Division, Sunbury, Penn.
4. Irovolite Tubing V-6094-3 1/8" I.D. V-6094-6 1/4" I.D. V-6094-8 3/16" I.D. V-6094-10 5/16" I.D.	"
5. 'Tuffernell' Westinghouse BT-2143 or equivalent (1/2 pint)	"
6. 'Lubriplate' (tube)	Fiske Bros. Refining Co. Newark, N. J.
(Obtainable at radio parts jobbers)"	

Then, just to make it more interesting -

Frank J. Mock, President
Television Installation Service Associates
Chicago, Illinois

writes:

"Dear Howard:

"A suggestion which you might want to include in your service is a warning regarding the use of anti-corona dope. We have found that this material will actually explode and burn if the set is turned on before the dope dries completely. After it dries, the danger no longer exists."

Many thanks, Frank. PHOTOFACT users will appreciate your warning. - H. W. Sams

* * *

Charles C. Foster, Junior
Editorial Manager
R. C. A. Review
Princeton, New Jersey

writes:

"The eleventh and twelfth volumes of the RCA Technical Book Series - - Television, Volume V and Television, Volume VI - - have recently been published by RCA Review.

"We would appreciate your including a listing of Television, Volumes V and VI in The Photofact Servicer.

"Copies of the books are available for the price of $2.50 each, plus $0.20 per copy for postage to countries other than the United States."

- - -

These books are well worth having in your library. If you are technically minded a subscription to the Review is one that will pay dividends in the personal satisfaction you will get out of it. For further data write Mr. Foster, c/o R. C. A., at Princeton, New Jersey, and mention the Servicer.

* * *

BOOK REVIEW

TELEVISION SERVICING
by
Solomon Heller
(Instructor American Radio Institute)
and
Irving Shulman
(Chief Engineer, Federal Television Corporation)

434 pages, 6 x 9, hard bound. Publisher: McGraw-Hill Book Co., Inc., New York 10, New York. Price $5.50.

The authors, in the preface to the book, write: "Acknowledgement is also made of the patience, understanding and encouragement of the authors' wives."

That simple sentence conveys a splendid impression of what will be found in this volume. The subject has been intelligently handled by two men with an excellent background. The book contains much theory. Five chapters are devoted to summation of the television system, antenna and receiver installation, test pattern analysis, and control adjustments. The ten chapters that follow analyze individual receiver sections. The last chapter deals with interference.

The book is thoroughly practical.

* * *

REVISION IN ALIGNMENT PROCEDURES

The following revisions in alignment procedures concern these receivers:

ADMIRAL Chassis 20A1, 20B1 and 21A1
Photofact Set No. 77, Folder No. 1

Refer to page 6 of the Folder and correct Item "A," under "Sound and Video IF Alignment," to read: "Use 6J6 tube with pin No. 1 removed to disable the local oscillator to prevent erroneous indications during IF alignment."

DEWALD Models CT-102, CT-103, CT-104, DT-160, and DT-161
Photofact Set No. 82, Folder No. 5

Refer to page 7, under "Video IF Alignment," and change the second sentence as follows: "Remove the local oscillator tube V3 to prevent erroneous indications. If the set has a Standard Coil tuner, use a 6J6 tube with pin No. 1 removed to disable the local oscillator during video alignment."

HOFFMAN Models CT-800, CT-801, CT-900, and CT-901
Photofact Set No. 63, Folder No. 11

Refer to page 8 under "Overall Video IF Alignment." The second paragraph should read as follows: "Insertion of sweep generator signal will vary with the type tuner used. Determine which tuner is being used and inject the signal as follows: Standard Coil Tuner, use 6J6 tube with pin No. 1 removed to disable the local oscillator. Connect the high side of the generator - point "J" - and the low side to chassis." (No change has been made with respect to the RCA or Sarkes Tarzian tuner instructions.)

A further point with respect to the use of the disabled 6J6 for alignment work - - - it is possible to bend up the No. 1 pin of the 6J6 tube (away from the glass envelope) to effectively remove this connection to the socket for alignment work. When alignment is completed, the pin can be bent down into position and reinserted for normal use.

CAUTION: It should be noted that if any one tube is used in this manner on several occasions, the pin will become weakened and snap off at the point where it emerges from the glass envelope. In general practice, it is best to have a single 6J6 tube on hand, with the No. 1 pin removed, for alignment work, since the tube can be used with the majority of present-day tuners employing a 6J6 as a mixer and oscillator.

FIELD EXPERIENCES -

For every "Field Experience" published, we issue a certificate good for one PHOTOFACT Folder Set. Awards are issued at the time of publication. Since it is impossible to verify the accuracy of contributions, we cannot be responsible for either the diagnosis made of the receiver trouble, or the results which will be obtained by following the suggested repair routine. All contributions become the property of Howard W. Sams & Co., Inc.

* * *

GENERAL ELECTRIC Models 805, 806, 807, 817, 821 Series
Photofact Set No. 78, Folder No. 7

Complaint: Touchy or uncontrollable vertical hold (may be intermittent).

Remedy: Replace integrator network capacitors C-78 and C-79 with new molded type rated at 600 WVDC to prevent callbacks. C-78 is .001 MFD. and C-79 is .002 MFD.

Kratz Electric
4112 Frederick Avenue
Baltimore 29, Maryland

* * *

DUMONT Chassis RA103
Photofact Set No. 93, Folder No. 4
and
Production Change Bulletin 6 in
Photofact Set No. 108, Folder No. 1

Complaint: No high voltage.

Remedy: Check 6K6GT horizontal oscillator tube plate voltage. If zero reading is obtained, change the 5000 ohm 10 watt wire wound resistor to a 5000 ohm 20 watt wire wound resistor.

DUMONT Chassis RA 103
Photofact Set No. 93, Folder No. 4
and
Production Change Bulletin 6 in
Photofact Set No. 108, Folder No. 1

Complaint: Compression on the right side of picture. Left side and center okay.

Remedy: Change the .01 MFD. 400 volt paper capacitor (grid coupling to pin 5 of 6BG6G through 100 ohms) to a .01 MFD. 600 volt capacitor. This capacitor will be found in various stages of leakage from 50,000 ohms to a dead short. The amount of compression will depend on the resistance of the capacitor.

Editor's Note: Both above Experiences were contributed by:

Henry W. Finch
North Jersey Electronics
441 Orchard Street
Englewood, New Jersey

MOTOROLA TV Chassis TS 14A, B
Photofact Set No. 92, Folder No. 4

Complaint: Set works perfectly for about fifteen to 20 minutes, then sides move toward center. Picture decreases in size, also brightness decreases.

Remedy: Replace both selenium rectifiers to be sure of no callback of same trouble. (Also found same trouble in Model 10T2, TS14 series.)

John H. Young
Beaver Road Paxtonia
Harrisburg, R. D. 3, Penn.

* * *

RCA Model 8X541
Photofact Set No. 59, Folder No. 16

Complaint: Loss of volume, noisy.

Cause: Tubes and voltages all checked okay. High voltage between chassis and B-. The output plate bypass was shorted to ground at the terminal strip. That was the cause of loss of volume.

The noise was caused by the shield around the socket of the 12SA7 being loose. This socket is fastened to the chassis with rivets and they were loose.

Remedy: I moved the condenser lead away from the ground lug of the terminal strip and soldered the 12SA7 socket shield to the chassis and it was okay.

Bud Fox, Radio Service
Mass Brothers
St. Petersburg, Florida

* * *

MECK TV Model XF 777
Photofact Set No. 101, Folder No. 5

Complaint: No picture. No raster. Sound okay.

Cause and Remedy: Shorted capacitor .05-C68. Replace with new unit.

MECK TV Model XF 777
Photofact Set No. 101, Folder No. 5

Complaint: No control over horizontal frequency.

Cause and Remedy: Filter capacitor C8C 10 MFD. at 450 volts, low in capacity. Replace complete unit.

Editor's Note: Both above Experiences contributed by:

Ervin F. Bauer
4764 Eichelberger Street
St. Louis 16, Missouri

* * *

MOPAR Model 802 Revised
Photofact Set No. 42, Folder No. 19

Complaint: Very noisy with little or no reception.

Cause: Breakdown of mica dielectric in the coupling capacitor of RF coil, Item No. 70.

Remedy: Take apart and repair, as I did, because I could not secure one pronto; or replace.

RCA TV Model 9T256
Photofact Set No. 93, Folder No. 9

Complaint: No control of height.

Cause: Open variable control No. R4 - 2.5 megohms.

Remedy: Replace.

Editor's Note: Both above Experiences contributed by:

John W. Smith
The Radio Shack
1602 West Pratt Street
Baltimore 23, Maryland

* * *

GENERAL ELECTRIC Model 150
Photofact Set No. 56, Folder No. 11

Complaint: Radio ran batteries down when not in use. Was intermittent.

Cause: I found that the switch had small piece of solder making contact with terminal which goes to capacitor No. 8 (in Howard Sams diagram 494-11), and the opposite side which goes to line 110VAC. In other words, the switch which connects line current across capacitor No. 8 was shorted at all times.

Remedy: Remove surplus solder.

Lester G. Basham
Basham Radio Service
Cave Junction, Oregon

* * *

FORD Model M-1 (8A-18805A)
Photofact Set No. 46, Folder No. 4

Complaint: Intermittent operation.

Cause: On several of these sets I have found that the cause is the opening of sensitivity control, Item No. 31.

Remedy: Measure the resistance to which this is set and replace it with a good one watt resistor of the same value.

Ben W. Whitesell
Ben's Radio Shop
Davis, Oklahoma

* * *

ZENITH - All 16" TV Models -
both round and rectangular

Complaint: Raster, but no picture. Weak sound. Sometimes no sound. Smell of burning resistor.

Cause and Remedy: Trouble in all these was found to be in the front end. The resistor to the plate of the RF tube was burned, due to a ground where connected to a mica stack. This consists of two or more discs of mica with conductive coating on both sides mounted in fibre or Bakelite squares. The mica burns through to chassis. Put a larger piece of mica next to chassis and rebuild stack. This seems to be a permanent cure as none of these jobs have caused further trouble. These sets also have a good number of shorted ceramics in the front end which caused the same symptoms. Burned resistor will easily locate bad capacitor.

R. C. Snell
Snell Radio Service
214 Fifth Avenue
Frankfort, New York

* * *

Editor's Note: The following Field Experiences were submitted by the Field Service Section of Howard W. Sams & Co., Inc.

TELETONE Model TV-306 Chassis "TY"
Photofact Set No. 104, Folder No. 12

Complaint: No sound. No picture. No raster.

Cause: Screen voltage on horizontal output tube very low (40 volts). B-plus line to video IF and tuner also very low. Coupling capacitor, Item C18, between mixer plate and first video IF shorted.

Remedy: Replace capacitor.

Analysis: The first video IF amplifier drew excessive current, lowering the B-plus line to about 40 volts (should have been 140 volts). Excessive current burned out 1000 ohm decoupling resistor, Item R12, and since it was hidden under other parts, it wasn't immediately apparent.

* * *

EMERSON Model 664B, Chassis 120133B

Complaint: No vertical sweep.

Trouble: Defective 12BH7 tube. When this tube became defective, the vertical oscillator section quit and the vertical output section drew too much current. This caused the 1500 ohm decoupling resistor to burn out.

Remedy: Replace resistor and replace tube.

* * *

U. S. TELEVISION Model T-10823

Complaint: Horizontal oscillator would not synchronize.

Cause: Oscillator running too slow due to change of resistor between grids on the horizontal oscillator and control tube. This resistor measured 9 megohms instead of 3.3 megohms as it should.

Remedy: Replace resistor and readjust horizontal oscillator circuit.

MOTOROLA Model 14T1

Complaint: No control over centering - extremely poor focus.

Cause: Focus coil resistance measured 470 ohms instead of 1600 ohms.

Remedy: Replace focus coil.

Note: This complaint is true of many chassis of this type, and many focus coils have been found to measure all the way from zero ohms up to about 50% of their normal value.

* * *

TRAV-LER Model 12-T

Complaint: Picture would not hold vertically or horizontally. Picture brightness and contrast seemed normal and the sound was okay.

Cause: Coupling capacitor, Item C47, had failed. This capacitor failed when the receiver was turned on immediately after being turned off. The set had been operating normally up to this time.

Remedy: Replace capacitor with good 600 volt unit.

* * *

ADMIRAL Model 36X45

Complaint: Intermittent on both sound and video after about 15 minutes of operation.

Repair: All IF tubes replaced one at a time made no change. No loose connections located. Chassis had to be removed to get at RF and oscillator tubes. These tubes were replaced and the 6J6 oscillator and mixer tested okay, but replacement repaired set. After leaving defective tube on tester for about one hour, mixer section showed defective. A voltage check on the receiver showed no change even during the dead period.

* * *

PHILCO Model 50-T1604

Complaint: Sound, but no raster.

Cause: As horizontal oscillator control was varied, a high whistle and breakdown in the high voltage compartment was noted. It was found that one of the 1X2 high voltage rectifiers was breaking down due to a fine crack in the glass.

Remedy: Replace the 1X2.

Complaint: Vertical sweep failure.

Cause and Remedy: After the set had been in operation about 1/2 hour, the vertical sweep stopped. Replacing the 7N7 made no change. Upon removing the sweep chassis, a short was noted between plate and grid leads due to poor wiring. The short was removed and set operated all right.

The PHOTOFACT Servicer

Vol. 29, Set 300 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ December 15, 1955

Dear Photofact Friend: —

PHOTOFACT Folder Set No. 300 appropriately symbolizes the completion of our "Third Century" of progress in supplying repair and maintenance data to the Electronic Service Field.

There is no better way to express our gratitude for your support than to bring you more for your money in PHOTOFACT Folders. We are doing exactly that. Beginning with Set No. 302, there will be four to six new TV Schematics included; this will be extra coverage at no additional cost to you. We intend to supply you continuously with more complete TV coverage than ever before, so schematics will be in your hands when new receivers reach the user.

There is another important point. Your attention is directed to the constant improvements we are making in PHOTOFACT. Since Folder Set No. 200 was published, there have been outstanding new additions; important among them are:

1. Variable control rotation noted on schematic.
2. Variable control "stops" noted on schematic.
3. All transformer and coil resistances over one ohm shown on schematic.
4. High voltage transformer terminal shown on schematic.
5. Signal paths shown on tube-placement charts.
6. Partial filament-string schematics shown in "Tube-Failure Check Chart" on applicable receivers.
7. Horizontal output transformer replacement connection data given in parts list.

Improvements will continue to come, as you indicate their need. That is why we welcome your letters. We pledge we will continue to do our utmost to make our service as complete, useful and profitable to you as is humanly possible.

We thank you most warmly for the opportunities you have given us to serve you. We look forward with enthusiasm toward meeting the challenges and sharing with you in the successes promised by our phenominally expanding industry.

Howard W. Sams

The PHOTOFACT Servicer

Vol. 30. Nos. 307 & 308 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ January 1, 1956

New Additions Summarized
To RETMA Production Source Code

The following companies have been added to the RETMA Production Source Code list since January 1955. This information should be made a part of the 1955 Registration list of RETMA Production Source Code appearing in Servicer in PHOTOFACT Set 286.

NUMERICAL LIST

Renewed

580 - *Rowe Industries, Toledo 9, Ohio
671 - *Lytle Engineering & Mfg. Co., Chicago 3, Ill.
758 - *Electrometric, Inc., Woodstock, Ill.
916 - Texas Electronics Mfg. Co., Inc., Houston, Tex.
922 - Standard Television Tube Corp., New Orleans 12, Louisiana

New

938 - Farnsworth Electronics Company, Fort Wayne, Indiana
939 - Antennex Company, Venice, Calif.
940 - Bomac Laboratories, Inc., Beverly, Mass.
941 - Electronic Engineering Company of Calif., Los Angeles 57, Calif.
942 - Federated Metals Division, American Smelting and Refining Co., New York 5, N. Y.
943 - G. M. Giannini & Co., Inc., Pasadena 1, Calif.
944 - Insulated Circuits, Inc., Belleville, N. J.
945 - The J & G Machine Co., Inc., Worchester 4, Massachusetts
946 - Mechanical Steel Tubing Corp., New York 34, New York.
947 - Pacific Semiconductors, Inc., Culver City, California
948 - The Radix Wire Company, Euclid 32, Ohio
949 - * Apex Coil and Transformer Corporation, Chicago 8, Ill.
950 - Feedback Controls, Inc., Alexandria, Va.
951 - Kost Products Company, Inc., Chicago 39, Ill.
952 - Rhein Sound Systems, Inc., Orlando, Fla.
953 - Scientific Radio Products, Inc., Omaha 8, Nebr.
954 - Union City Filament Corp., Union City, N. J.
955 - United States Electronic Research & Development Corp., Detroit 16, Mich.
956 - Vitramon, Inc., Bridgeport 1, Conn.
957 - Winston Electronics, Inc., Philadelphia 27, Pennsylvania
958 - Five Star Manufacturing Co., Houston 20, Tex.
959 - *Transitron Electronic Corporation, Melrose, Massachusetts
960 - *Ontario Industries, Inc., Hornell, N. Y.
961 - Anton Electronic Laboratories, Inc., Brooklyn 37, New York
962 - *Televideo Corporation of America, Los Angeles 12, Calif.
963 - Foto-Video Laboratories, Inc., Bloomfield, N. J.
964 - Huggins Laboratories, Inc., Menlo Park, Calif.
965 - Moloney Electric Company, St. Louis 20, Mo.
966 - Mullenbach Division of Electric Machinery Mfg. Co., Los Angeles 58, Calif.

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969 - Reeves-Hoffman Corporation, Carlisle, Penna.
970 - TelAutograph Corporation, Los Angles 19, Calif.
971 - Vector Electronic Co., Los Angles 65, Calif.
972 - *Industrial Tubes, Inc., Geneva, Ill.
973 - *PCA Electronics Inc., Santa Monica, Calif.

ALPHABETICAL LIST

Renewed

*Electrometric, Inc., Woodstock, Ill. - 758
*Lytle Engineering & Mfg. Co., Chicago 3, Ill. - 671
*Rowe Indsutries, Toledo 9, Ohio - 580
Standard Television Tube Corp., New Orleans 12, Louisiana - 922
Texas Electronics Mfg. Co , Inc., Houston, Tex. - 916

New

Antennex Company, Venice, Calif. - 939
Anton Electronic Laboratories, Inc., Brooklyn 37, New York - 961
*Apex Coil and Transformer Corporation, Chicago 8, Illinois - 949
Bomac Laboratories, Inc., Beverly, Mass. - 940
Electronic Engineering Co. of Calif., Los Angles 57, California - 941
Farnsworth Electronics Co., Fort Wayne, Ind. - 938
Federated Metals Division, American Smelting and Refining Co., New York - 942
Feedback Controls, Inc., Alexandria, Va. - 950
Five Star Manufacturing Co., Houston 20, Tex. - 958
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G. M. Giannini & Co., Inc., Pasadena 1, Calif. - 943
Huggins Laboratories, Inc., Menlo Park, Calif. - 964
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Mechanical Steel Tubing Corp., New York 34, New York - 946
Moloney Electronic Company, St. Louis 20, Mo. - 965
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North American Aviation, Inc., Downey, Calif. - 967
*Ontario Industries, Inc., Hornell, N. Y. - 960
Pacific Semiconductors, Inc., Culver City, Calif. - 947
*PCA Electronics Inc., Santa Monica, Calif. - 973
The Radix Wire Co., Euclid 32, Ohio - 948
Rapid Die and Molding Co., Schiller Park, Ill. - 968
Reeves-Hoffman Corporation, Carlisle, Penna. - 969
Rhein Sound Systems, Inc., Orlando, Fla. - 952
Scientific Radio Products, Inc., Omaha 8, Nebr. - 953
TelAutograph Corp., Los Angeles 19, Calif. - 970
*Televideo Corporation of America, Los Angles 12, California - 962
*Transitron Electronic Corp., Melrose, Mass. - 959
Union City Filament Corp., Union City, N. J. - 954
United States Electronic Research & Development Corp., Detroit 16, Mich. - 955
Vector Electronic Company, Los Angles 65, California - 971
Vitramon, Inc., Bridgeport 1, Conn. - 956
Winston Electronics, Inc., Philadelphia 27, Pennsylvania - 957

(*) Indicates Non-Members.

CORRECTION NOTE

Airline Models 25GSE-3062A, 25GSE-3063A, 25GSE-3081A

PHOTOFACT Set 195 Folder 2.

Picture tube listing on page 12 and schematic diagram should be 21FP4A.

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